

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

IMPROVEMENTS IN PUDDLING IRON.

THE AUTHOR OF THE BOOK "ON PUDDLING."

There is to be no commercial question at the present time of so much importance as that of cheapening the mode of purifying crude iron.

Who are conversant with puddling iron will admit that the question is of paramount importance. It is also a question which has been under the consideration of the élite of iron manufacturers for many years, and on which a large amount of money has been expended, yet it still is an unsolved question. My opinion on this question for some years has been that when the science of puddling is perfectly understood there will be no difficulty in devising a method to perform it, and when the action of the machinery directed that it will communicate to the iron the kind of action required in the process, then this important question will be solved in an easy and satisfactory solution. I am aware that puddling is regarded as very peculiar, to which I have attributed a practical character, have stood the test of time, and can be relied upon.

The way by which the present mode of purifying crude iron is effected is by reducing the cost in materials and labour. The materials chargeable to the process are fuel, fettling, and the waste heat that escapes from the furnace. There are three ways by which the cost in fuel can be reduced:—by complete combustion of the coal used, by rendering the process the heating power stored up in the pig-iron, and by utilizing the waste heat that escapes from the furnace. It is very plain to all concerned in puddling that the whole of the heat is not consumed, but that much of it is wasted in the furnace. The carbon thrown away as refuse in the ashes has a great calorific value as the part of the coal consumed, and is capable of doing nearly as much work. The part of pig-iron that is puddled there is an indefinite amount of carbon, both in the free and combined state, and when introduced into molten iron of this description for the purpose of otherwise, it raises an intense heat, as may be seen in the process. In fining iron in the ordinary way the heat is unavailable for puddling, except what is retained in the furnace, at some places, it is run from the fining into the furnace. By fining the iron in the way I shall describe a temperature is raised, and is available for heating the puddler. Although much of the coal used is wasted in the furnace, it is evident that more heat is given out by that part which is rendered latent in melting and puddling a ton of iron. It must be apparent to all who observe what goes on in the puddling-furnace that the heat is more intense in the flue than in the furnace, and that the heat thus wasted is doing more work. If, then, I completely consume the heat of the pig-iron, and if I get double duty from the fuel by one charge with the waste gases escaping from the melting, I maintain that such will reduce the cost in fuel.

The boiling system is essential, but, if it is not suitable, it is to the quality of the iron, and a cause of loss in quantity, also a very expensive material in puddling. Though it is to use it in boiling pig, yet crude iron can be converted into malleable state better without it, therefore its attendant cost should be dispensed with. The use of fettling is now regarded as of profit, but this wants confirming.

No evidence to prove that graphite becomes carbide in iron, neither is there any appreciable amount of iron reduced by fettling, either in an ordinary or patent furnace, and if the iron is oxidized to the highest point, so as to form carbonic acid, instead of an increase of yield, an extra loss of iron. Iron, I only confess that in this item there is a great difference between the cost per ton by my system and another I will introduce. I have considered Danks's furnace capable of improvement, and that when 10 charges per shift of 10 cwt. each could be made it would effect a further saving of 5s. 4d., making a total of accordingly, I made the following "speculative estimate" with this I compare mine:—

DANKS'S SYSTEM.		£	s.	d.
Melting pig-iron in cupola in wages, coke &c.	Tons 0 18 2 25 at 50s.	2	6	0
Puddling	0 15 0 0 " 5s. 6d.	0	4	2
Fettling	0 5 0 0 " —	—	—	—
Other purposes	0 4 0 0 " —	—	2	6
	0 6 0 15 at 20s.	0	6	2
	0 0 2 3 " 50s.	0	1	4
		0	8	0
		0	5	6
		£4	0	6

BAYLISS'S SYSTEM.		£	s.	d.
Melting	Tons 1 1 3 0 at 50s.	£2	14	4
Puddling	0 12 0 0 " 5s. 6d.	0	3	4
Other purposes	0 4 0 0 " —	0	1	1
		0	9	0
		0	5	6
		£3	13	3
		0	7	3

Now describe, as briefly as is consistent, the apparatus and operation. The furnace consists of melting, fining, and puddling respectively. The melting has three tuyeres at the bottom, and a hopper on the top for coal, with a draw-bar at the bottom. It has no grate, but a hearth, with a kind of well similar to a race. The fining part is specially constructed with water and tuyeres for blast, set very near the bottom. The puddling is of a circular form, it has the drawing door at the end, and a stopper hole on one side, so that it can be worked as a furnace. On each side of the door frame at the end is a small opening into a main. This arrangement prevents the cutting of iron acting upon the iron, and as the plenum and temperature of the flame is regulated by the blast, the peculiar construction is of no consequence. There is a slot on the stopper hole

side, and half way through the top of the furnace, through which the puddling tool is introduced and taken out. This is closed with suitable doors. When necessary the slide bar is drawn out of the hopper, and the coal falls instantly over the tuyeres. The iron is charged in a minute or so, by means of a crane and peel, through an ordinary puddling door. When the charge is melted it is run into the fining, and another introduced. The air being forced into the iron near the bottom, has to permeate it to escape at the top, and as it does so the oxygen comes in contact with the carbon, and raises an intense heat, not only in the iron but also in the surrounding chambers, and thus it becomes a source of economy in fuel. I will remark here, that as a practical finer I have made as good fine metal in this way as ever I have done by the old way of fining. The iron being properly fined it is run into the third chamber, where it is quickly and effectively puddled.

From this brief description it will be seen that the iron is melted on a hearth by means of blast in contact with the fuel, and that this method consumes all that is combustible in the coal, and fluxes all that is siliceous, and causes it to flow out after the iron. It will also be seen that the puddling and melting processes are carried on together, and that the waste heat escaping from the melting of one charge is used in puddling another. It would be easy, where it is necessary to do so, to prove that 12 cwt. of coal is ample to produce a ton of puddled bars. To operate on crude pig in a bath of cinder necessitates the use of fettling, but to fine iron, previous to puddling, dispenses with it, because the fining facilitates the puddling, by reducing the fluidity, and neutralising the corroding properties of the iron.

I shall not make any invidious remarks about a rival patent, but I repeat that fettling is a very expensive item in puddling, and yields no compensation for the expenditure. In the above estimate, after allowing it to compensate to the extent of 1 cwt. 1 qr. of pig-iron to the ton of bars, it is 6s. 2d. per ton; but what will it be when it turns out, as ultimately it will do, that it yields no iron? There are places where nothing but fine metal is used, and that furnaces working plate-iron require no fettling. These are facts which, I think, no one will dispute; therefore, I need not adduce evidence to prove them. I may remark that if the system I have partially described will not require fettling, then it must tend to cheapen the mode of purifying crude iron. If the two estimates be compared, it will be seen that there is a difference of 3 cwt. of pig-iron per ton of puddled bars between them, and that the balance is in favour of the American furnace. This is said to be due to the large amount of iron reduced from the fettling, but if we look a little under the surface we shall find that it is not iron, but cinder. I believe the truth has been candidly stated for the first time; it was stated "that 15 tons 4 cwt. of pig-iron yielded 14 tons 10 cwt. of puddled bars," which means a loss of nearly 1 cwt. per ton, and this takes place when "½ ton of purple ore, hammer scale, and such like, is charged every heat." The iron produced by the two furnaces may be fairly represented thus—the ball from Danks's as a saturated sponge, and from my plate-iron as lead.

Now, those who know the difference which the density of bars make in producing finished iron will understand that it will take much more of the former than the latter to the ton. Then, if the comparison be made in this way, how much pig-iron will it take to produce a ton of finished iron, instead of a ton of puddled bars? It will be seen that it will take but little more, if any, by my system than the other. If it be taken into consideration that mine is an improved method of fining iron, that I have the greatest facilities for utilising what hammer slag and mill scale may be made, and that I lose but very little by oxidation in puddling, I think it will be acknowledged that 21 cwt. 3 qrs. of pig will produce a ton of puddled bars. The rotary principle is said to be "the right principle" for puddling iron; but I think otherwise.

The rotary principle is not calculated to communicate to the iron the kind of manipulation it requires, except under certain conditions, and to comply with these conditions will prevent the rotary furnace from becoming economical. Iron to be perfectly puddled after it is all melted must be equally worked and kept open till the whole of the gaseous and silicious matter is worked out of it, but manual puddling is not equal to this, because the puddler can only operate in one part of his furnace at the same time. My revolving puddling tool operates in two parts of the furnace at the same time, and this so quickly and effectively that the iron cannot irregularly agglutinate or clog together. It is easily managed, and is not liable to get out of order, and is so balanced that it will exert no more friction on the bottom than is required to clear it. It will not require changing, as one tool will get the heat ready to ball. I have seen one hand-rabble get the iron into a state of fermentation, much more will the machine tool do it, as it will do more work than nine men with a rabble each. The furnace is capable of producing from 50 to 60 tons of bars per week, and of such a quality as cannot be surpassed. The weight of charge is what will produce ½ ton of puddled bars; more might be worked, but this is the safe limit both for yield and quality. I have stated the price per ton at 9s. Ironfounders say they can melt 2 tons of pig-iron per hour; if they can do this, as I melt nearly on the same principle, it is not extravagant in me when I say I can melt and puddle 11 charges in 11 hours, equal to 5 tons 10 cwt. bars. The labour can be distributed in this way, two forehands, two underhands, and a labourer to each furnace, though I cannot see what there will be for them to do. The labourer will attend to the charging and melting, and the puddlers will attend to the fining and puddling, and ball and draw the iron in the usual way. From this it will be seen that the puddlers will not have to fire, charge, fettle, nor clear the grate; they will simply attend the fining, and direct the operations in introducing and withdrawing the tool, and the puddling thereby, till the iron is ready to turn out for balling. Suppose only 10 charges per shift to be worked, or 5 tons of iron made, this at 9s. would be 2l. 5s. The labourer would have a good berth at 6s. per shift, so that the others would have good wages and less work.

This furnace is adapted to work with any kind of fuel from anthracite coal to peat, and produce a superior quality, especially steel. Practical men who have seen and worked the furnace have raised no objection to it, but are confident of its utility and success. I have not invidiously assailed the so-called American furnace, which I have watched, and been well acquainted with the last 10 years, neither have I knowingly stated anything about my own calculated to de-

ceive my readers. I would not have referred to the Danks Patent had it not been so persistently opposed to mine in a secret way. In conclusion, I beg to call the attention of iron manufacturers to a fact that has hitherto been disregarded. Before "pig-boiling" was discovered fine iron only was puddled, and at that time there was two ways of working it, which for distinction I will call the Staffordshire and Yorkshire systems. The former was known as the "drying system." The iron it produced by skillful workmanship was of a fine fibrous quality, but it was inadequate to produce a hard quality, or natural steel, and being imperfect, and degenerating through various causes, it was superseded by puddling crude pig.

This last system has had its day, and must give place to a better, more remunerative, and scientific method. The Yorkshire way of puddling fine metal is intermediate between drying and boiling iron, and used to be known in the South as the "fomenting way;" it continues as it ever has done to produce a superior quality, while other systems are still subject to change. The opinion was that the excellent quality of the Yorkshire iron was due to the natural advantages they possessed in having superior coal and iron ore, but this opinion is not correct, and is not so general as it used to be. The fact I wish to call attention to is this, that however adapted to produce a superior iron the raw material may be, it is not due solely to this cause, but to an advanced and peculiar method of puddling, and that the iron made in other counties will yield equally as good results if treated in the same way. There is another thing that has not received the attention which its importance requires—viz., that there is a large quantity of pig-iron produced capable of yielding a superior malleable iron with proper treatment, but is contaminated with ingredients which cannot be eliminated by the ordinary way of puddling; I refer to those kinds of iron that are either "red-short" or "cold-short." Fining the iron prior to puddling it has proved ineffectual to expel them, yet there are substances to which they will and have yielded, but cannot be conveniently and economically applied in the present way of puddling. The Heaton and Henderson processes have proved this. My furnace combines in it not only the identical method of puddling fine metal in Yorkshire, but is an improvement on it in the cost of production, while it possesses facilities for the introduction of chemicals into the fining part, which no other furnace has.

Workington, May 19.

B. BAYLISS.

THARSIS SULPHUR AND COPPER COMPANY.

With only a very few years existence this company has come to be one of the most prosperous mining concerns in the world, and some account of its history and present position cannot fail to be acceptable to our readers. The mines of the company, which are situated at Tharsis and Calanas, in Spain, are the property of a French company, who wrought them with more or less success for a period of twelve years prior to 1866. When the French company began operations they discovered many evidences to show that these now celebrated mines had been extensively worked by the ancients, and more recently by the Romans, and they are on that account no less interesting to the archaeologist than to the metallurgist. The evidences of their very early occupation are accumulating in the hands of the present company. They consist of immense slag or refuse heaps on the surface in the immediate vicinity of the mines, together with underground workings that have been prosecuted by ancient enterprise to a very considerable extent. Interesting traces of the extent of the former workings, and of a population which must have existed at these mines long ago, are constantly being discovered, in the shape of Roman coins, stone coffins, ear-bottles, Roman water-wheels, and other relics of a bygone civilisation. But, although in their day the early occupants of the mines, no doubt, extracted from them a great deal of wealth, they certainly did not impoverish them. The enormous quantities of mineral still proved to exist in the mines will very probably enable the Tharsis Company to pay handsome dividends to its shareholders for generations to come.

The Tharsis Sulphur and Copper Company (Limited) was formed about seven years ago, and in 1866 entered into an arrangement with the French proprietors, whereby they obtained a lease of the mines for the long period of 88 years. Of that period 81 years have yet to run, and will afford ample time for the partners and their successors to get rich by their investment. Of course, the latter result could only be attained by good management and enterprise befitting the circumstances of the case, but the Tharsis Company is fortunate enough to possess both these conditions in assuring abundance.

The following statistics, illustrative of the progress and extent of the company's operations, derived from their reports, will be interesting to our readers. The quantity of mineral extracted at Tharsis in 1869 was 187,039 tons, and at Calanas 30,758 tons, together 217,797 tons; in 1870 it reached a total of 309,866 tons, an increase on the year of 92,067 tons. In 1872 the quantity raised at Tharsis was 333,460 tons, and at Calanas 41,055 tons; together giving a grand total of 374,515 tons, or an increase of no fewer than 156,718 tons over the output of 1869.

The productive capabilities of the mines have not as yet been anything like fully tested. At the Tharsis Mines the sole source of the mineral supply has hitherto been the north lode and open-cast, which have been very productive, and will be still more so. During last year 153,430 metres of overburden were removed from this portion of the mine, at a cost of 13,310l., uncovering either wholly or in part to Dec. 31 last about 9,428,581 tons of mineral, calculated only, however, to the depth at which the mine is drained, and can at present be worked without inconvenience. Boring operations were commenced on the Central lode in August last, and a number of shafts were sunk on the ore, and the borings proved that the mineral existed at an average depth of 16 metres. A great deal of work has also been done at the south lode, with a view of preparing it for the operations of the miner; and it is expected that in the course of a few weeks it will be ready for a commencement. A drainage gallery, about 576 metres in length, has been constructed at the last-named lode; and both Central and South lodes are expected shortly to be in a position to give a yield of mineral that will very much enhance the present extraction from the mine.

The Calanas Mine, which is situated 15 miles north-east of Tharsis, is also in course of extension, and can be made to bear considerably larger draughts upon its wealth. The means, or rather absence of

means, of transit between Calanas and Tharsis presents, however, an obstacle to the rapid and extensive development of the resources of the former. The mineral at Calanas, therefore, has to be calcined, and carried in the form of precipitate to Tharsis on the backs of mules. From Tharsis to the shipping port of Huelva, a distance of 30 miles, the means of communication have been greatly improved by the present company, who have constructed a railway and provided a competent supply of rolling stock for the purpose. The mineral is carried down to the coast by this railway, which also brings a return to the company by carrying traffic belonging to other parties. A new pier has been erected at Huelva in order to facilitate the shipment, and although the works have necessitated a great deal of outlay they will ultimately effect a large saving in the working expenses. In proof of this, it may be noticed that up to 1870 the shipments were effected by means of barges, at a cost of 2s. per ton, whereas last year they were made from the pier at only 11d., and this expense will soon be further reduced by the erection of additional crane-power. The number of vessels employed in the transit of the mineral in 1871 was 100—70 steam and 30 sailing; but last year the number had increased to 319, of which 211 were steamers and 108 sailing vessels.

During the last two or three years an almost incredible amount of money has been spent by the company in the improvement of the mines and their appurtenances. Not to go further back than the last 12 months, we find that in that time they have, after heavy writings-off, added to their capital in works, buildings, machinery, and plant in Spain to the extent of 21,504l. Three stationary and one small engine have been added to the works of the mines, four new groups of houses, providing 52 good dwellings, have been built for the workmen, a girls' school, to be used also as a Protestant chapel, has been erected, new roads and railways have been made, and fresh explorations of the mines have been carried out. All this has been charged to the account of the year, and extensive and costly improvements have, besides, been made on the metal works belonging to the company in this country. Of the last-mentioned works two are at Glasgow, two on the Tyne, one at Widnes, in Lancashire, one at Oldbury, near Birmingham, and large works are at present in course of erection at Cardiff.

To give an idea of the financial progress of this company it will not be necessary to go further back in its history than the year 1869, and it will be well to bear in mind that in that year, as compared with previous ones, there was a considerable depreciation in the market value of both sulphur and copper, which had exercised an unfavourable influence upon the operations of the company. The profits earned during the year 1869 amounted to 53,509l. 10s. 6d. Of this sum 36,994l. 18s. 7d. was devoted to dividend, giving 5 percent. to the partners (free of income tax), and the remainder, less income tax and the remuneration of the directors and auditors, was carried forward to next account. In compliance with the desire of a large number of shareholders for half-yearly dividends, the directors declared and paid in November, 1870, a dividend of 5 percent. additional to that paid in May on the earnings of 1869. The net profits of 1870 amounted to 94,571l. 17s. 6d., an increase over those of the previous twelve months of no less than 41,062l. 7s. A second dividend of 5 percent. on the earnings of the year 1870 was paid in May of the following year, after 27,206l. 15s. 5d. had been set aside for next account. It would thus be seen that the dividend paid in 1870-71 was exactly double that of the preceding year. The system of paying half-yearly dividends, one of which was paid while the account for the year was running, although not productive of any serious or embarrassing results, was not considered altogether satisfactory by the directors and shareholders, and by a unanimous resolution passed at the annual meeting in 1872 the board of directors was empowered to make an alteration which saved a great deal of trouble, and offered a guarantee that the company should not by any means run short of funds. Instead of paying two distinct dividends in each year, it was resolved that no money should be paid away until it was declared to the partners at their annual meeting that it had actually been earned. This was to be done in April of each year, and the dividend paid in two equal instalments in May and November following. The profits for the year 1872, with the balance for the previous year, reached the very large sum of 377,961l. 12s. 5d., showing an increase on the profits of 1869 to the extent of 324,452l. 1s. 11d. In other words, in the course of the past three years the profits have increased considerably more than fivefold. It should be stated the sum given as net profits was what remained after the expenses of the year and the writings off for depreciation had been made to the extent of 146,000l.

It was with this magnificent and clearly earned income in their coffers that the directors were enabled a few weeks ago to announce the extraordinary dividend of 40 percent., a dividend which must have been exceedingly gratifying to the partners, coming as it did, when mining ventures, like the Emma for instance, were in a position so unsatisfactory that the shareholders were up in arms against their management, and fearful lest ruin should be about to overtake them. The position of the Tharsis Company is shown to be all the more sure and stable by the fact that it is confidently anticipated the dividend of next year will be little, if any, short of 50 percent. A very great deal of the prosperity of the company is undoubtedly due to its excellent board of directors, which is presided over by Mr. CHARLES TENNENT, of the St. Rollox Chemical Works, Glasgow, a gentleman whose eminent business qualities are abundantly manifested in the management of the gigantic and lucrative private business in which he is engaged. The partners of the Tharsis Company have reason to congratulate themselves that at a time when, in some quarters, the standard of commercial morality was not exceedingly high, and when disclosures were being made which showed that numbers of speculators had been drawn into fictitious concerns by the display of "bogus" shares, they had found a safe and highly profitable investment; and they certainly might do worse than adopt the advice tendered by one of themselves (Mr. JASPER W. JOHNS, of London) at their last annual meeting. He said he should like to see all the present holders of shares lock them up in their safes and leave them to their grandchildren, because it was quite clear, from what they had heard from the Chairman of the company in reference to the unburdening of their mineral, that they had a mine of something like 100 years duration at the very least, and that was a source from which he was sure they would all derive very great benefit.

MINING IN COLORADO.

Sir,—Notwithstanding the indifference, almost amounting to disavowal, into which Colorado mining speculation has fallen of late in England, I venture to bring the subject at this time before your readers. Compared with California, Nevada, Utah, and other western States and Territories, Colorado produces to-day the richest ores, both of gold and silver, which are sent to Swansea or Freiberg. I do not in this letter propose to enter into the reasons why the companies and associations, most of them unwieldy and possessing high-sounding titles, now operating in this and neighbouring counties, have ceased to be, or failed to become, dividend-paying investments. My object is chiefly to draw the attention of your readers to what appears to me the most remunerative field for small investments ever presented in any mining country, an avenue which will become closed in June, 1874, when the Amended United States Mining Act comes in force. In the interim between the present and that time locators and purchasers will be compelled to so improve their lodes (of which there are legion) sufficiently to entitle them to a United States patent, or they will become liable to forfeiture and re-entry.

Under these circumstances many persons who from poverty are unable to perform the requisite \$500 worth of improvements thereon are offering an half-interest in their lodes as an inducement to capitalists to accomplish for them the necessary amount of work on the lodes to obtain their full title to the property. Many of these properties are, no doubt, of the most valuable character, within the richest belts of lodes, and, in all probability, would become paying investments.

I may here state that the Colorado Central, the Saco, and many other lodes of like celebrity at the present time, producing large quantities of very rich ore, could at a very recent date have been

secured on the above terms for a few hundred dollars, whilst these same properties could not to-day be obtained for as many hundred thousands.

It appears to me, as a miner of considerable practical experience both in England and the States, that this Territory exhibits in this direction both to the large and moderate capitalist an extraordinary opportunity for investment. For instance, by an expenditure of (say) 3000l. one-half interest in from 20 to 30 lodes could be obtained, a good percentage of which would, in all probability, prove to be valuable properties. Of course, it is presumed that in the selection of lodes upon which to operate the investor will be guided by persons of recognised probity and practical experience, who are thoroughly acquainted with the country.

I hope the present letter is sufficiently clear to enable your readers to comprehend my meaning, and the opportunity afforded them; but I shall be glad at any future time to furnish you with any additional information on this or like subjects.

DANIEL ROBERTS, Mining Engineer.

Georgetown, Clear Creek County, Colorado Territory, U.S. of America, April 9.

A FISSURE VEIN.

Sir,—The reason why some persons fail in mining while others succeed is very plain: the former observe the established principles of Science, while the latter ignore them. Nothing is more usual in these latter days than for persons to purchase a claim, and call it a "mine." Perhaps it may be simply a float deposit of silver-bearing ore in the Eureka district, or the White Pine district, in Nevada, or argentiferous galena in Utah; it may have been rich for 100 or 200 ft. in depth from the surface, and become suddenly worthless and exhausted. When this occurs it is explainable upon well-established scientific principles—the deposit was superficial, it was merely a mass of float rock carried there by the "diluvium" of former ages, and hence no one should have expected or promised permanency for it.

If anyone desires to invest in a mine which will be permanent, and improve in wealth as he descends upon the vein, let him invest in a "true fissure vein." Prof. Whitney in his "Metallic Wealth of the United States," says:—"True fissure veins are continuous in depth, and their metalliferous contents have not been found to be exhausted, or to have sensibly and permanently decreased, at any depth which has yet been obtained by mining." In further illustration of this subject the following is especially instructive, and as it is contained in the United States Official Report on the Mineral Resources of the States and Territories West of the Rocky Mountains, transmitted to Congress March 5, 1868, it is entitled to the highest confidence:—"The mother gold lode of the State of California is in many respects the most remarkable metalliferous fissure vein in the world; the gold is generally in fine particles, and is distributed evenly through a large portion of the lode in the pay chimneys, and there is very little of the rock entirely without gold. The width varies from 1 ft. to 30 ft.—that is, the main vein as worked; but it is accompanied by branches or companion veins, so that the total width of vein matter is sometimes nearly 100 feet. We do not find in our books mention of any similar auriferous deposit in other countries."

As an evidence of the two characteristics of a fissure vein—inexhaustibility in depth and increasing richness in descent—take the Hayward Amador Mine of California, situated upon the mother lode. This remarkable mine has paid over 2,000,000l. sterling to its owners. It has been worked with increasing richness to its present depth of over 2000 feet, the rock gradually rising in value from 2l. to 5l. per ton, and now, at its depth of 2000 feet, it is worth 6l. sterling per ton, and is worked for 1l. The same geological features are shown by the other gold mines on the mother lode, in Amador county, California, but my object is to establish one single proposition—viz., fissure veins are permanent, float deposits are temporary, and the above is sufficient for this purpose. ANGLO-AMERICAN.

AMERICAN MINES, AND FINANCIAL AGENTS.

Sir,—I beg to enclose a slip cut from the *Salt Lake Endowment* relative to the Emma Mine, and which also shows to some extent the reason why American mines have up to the present time been unsuccessful here. Although we (inhabitants of the Western Pacific Coast) are spoken of here in terms anything but complimentary, on account of the miserable failures that most of our mines have turned out, the ills that English stockholders have to bear are of their own making—or, I should say, are made by their "promoters." I can fully confirm everything that the writer of the enclosed says respecting the way mines are "stocked" here. Last year I myself offered on this market a property in Nevada for the sum of 60,000l. The brokers, through whom I was negotiating, told me that I must allow them to add 10,000l. to this amount for their commission and legal expenses; to this I agreed, and the "sale" progressed so far that we met at the "proposed purchaser's" office to sign contracts, &c.; but during the interview it accidentally transpired that the small sum of £75,000 had been added by the brokers, without the knowledge or consent of either myself or my co-partners. Of course the sale fell through. Many of the properties that have been sold here and brought out in companies are undoubtedly good, but have been really damned by the exorbitant "squeeze" of promoters, brokers, &c. The Emma Mine is an undoubtedly good property, but I can quite understand that it is an "awful strain" on the mountain to keep up paying the dividends on such an amount as \$5,000,000; but with proper and economical management, I think the Emma can pay a good dividend even on that amount for some time to come.

But apart from this, it is a strange truth that English capitalists have seemingly preferred doubtful mining risks in America to sound properties. They have persistently refused to buy anything that can bear an honest investigation, and the "experts" that have been sent out generally prefer fishing, shooting, and sport in general to the more arduous duties of properly examining a property. Many good mines, properly developed, and with collateral security for at least a part of the purchase money, in the shape of mills, tramways, and substantial machinery are to be had, if we could only come in direct communication with the capitalists; and not be bothered by brokers, promoters, "financial agents," &c. *et multis alies*, all of whom expect to be paid. Another thing is also necessary, before concluding any purchase—the purchasers should send out from here a trustworthy and competent mining engineer, one who will, notwithstanding the very probable temptation of *filthy lucre*—make a faithful and proper examination and report on the property in question. When this is done the confidence in American mines (which ought never to have been forfeited) will again obtain in the minds of English investors. I do not say that all the mines which have been brought to this country have been of the highest class—in fact, I fear that many have been of the "wild cat" tribe; but they are only very small drops in the very large ocean of valuable properties in our Western States; and for all evils there is generally a remedy, and I have endeavoured to point out the remedy for this one. FACT.

London, May 21.

"THE EMMA MINE, AND LONDON STOCKHOLDERS.—The London Mining Journal of March 29, as we learn by the *Tribune*, contained the following:—"Emma shares have declined to 8½c. Dissatisfaction continues to be expressed at the reticence of the directors in face of all sorts of disconcerting rumours; it is generally believed on the Stock Exchange that the first report from the newly-appointed manager (Mr. G. Atwood) has been received, and that it is of a decidedly unsatisfactory character; it is also rumoured that there has been another accident at the mine." To begin, no report from Mr. Atwood had reached London at that date. He had reached Salt Lake on the 14th, and had not time to get a report to the directors by the time of the Journal's publication. In the second place, all the English stockholders bear the natural consequence of English cupidity—as fully set forth in our San Francisco letter several weeks ago. For instance, an agent for American miners goes to London to find a market. He very soon discovers that he can do nothing except through the intermediation of English promoters. Since our letter, above mentioned, the points set forth in it have been decanted upon by other journals. The English promoter asks: "What do you ask for your mine?" "Two hundred and fifty thousand dollars," says the American holding his breath. "Fine! We can't do anything with it at that." "We expect," says Mr. Agent, "to allow you a handsome commission out of that." "Commission out of that? We can't do anything with a property that can't be stocked for a million." "Very well," said Agent, gaining courage, "it is worth a million if you can get it." "Well, put it at two millions and a half, and take hold." "And how much of that goes to the owners?" "Two hundred and fifty thousand coin, two hundred and fifty in ordinary shares."

And it goes; and that is how these complaints from British stockholders come. The stockholders are imposed upon. If the Emma had gone into the hands of the stockholders at the price, or double the price, received by the locators of the mine,

it would to day be regarded as one of the best investments that British gold went into. It was stocked at 5,000,000, and it is going to be an awful strain on the mountain to deliver up dividends to meet British expectations."

MINING IN COLORADO—PHILIP'S MINE, BUCKSKIN PARK COUNTY.

Sir,—In consequence of the severe weather—continual snow and wind—since my arrival here, I have been prevented from seeing anything of the mines in the district other than the one above named, which I am getting into working order as fast as possible, and, judging from what I have yet seen, it is a valuable property, and, perhaps, a few particulars of it will not be uninteresting to your numerous readers. The lode was first discovered in the year 1870, by Joseph Megar, alias "Buckskin Joe," an Englishman, I believe, from Derbyshire, who, with his two partners, commenced operations on the lode at the foot of the mountain, where the surface quartz was very rich, and the lode of great width, being from 30 to 40 feet wide, and extending about 1000 ft. into the hill, and about 20 ft. in depth, which gave a profit of \$394,000 to the three proprietors by washing the ore in sluices, yielding about \$240 per solid fathom by that process, and would have yielded double that amount by stamping, as some of the quartz is very hard, and was all thrown away, which has been taken up and stamped by other parties, and given immense profits, of which no returns have been kept. Below the surface ore, at the depth above mentioned, there is a solid lode of iron pyrites, and a portion of copper ore 20 ft. wide, that will yield under stamps about \$80 per cord, and will make at the smelting works from \$10 to \$15 per ton, and will leave large profits at the price, and from present indications, as we sink through this ore, I think we shall get to a productive lode for copper and gold, and shall have one of the best mining properties in Colorado.

There are other mines near here, and the Mountbello Mines, about three miles distant, which I shall visit as soon as the weather permits, and send you the particulars of how they are looking, and what their prospects are for the future. We have one smelting works that has been running all the winter with one furnace, and now they have commenced to put up another; and the Boston and Colorado Company of Black Hawk will commence to build their furnaces this week for a capacity of 20 or 30 tons per day, and other works of a much larger extent, which will, I think, command the ore that can at present be raised at a high price, and unless some lodes are discovered, I fear there will not be a sufficient quantity to supply them, unless they purchase ore of a low price, or get it from the other side of the range, which will be expensive in carriage.

When I left Central City the machinery was started in the Bolander tunnel for draining the water below that level, which I should have mentioned before this if I had any confidence in its answering the purpose. But as the machinery was the invention of the manager, who is very presumptuous in his own views, I have waited the result, and I am sorry to say that my predictions have been verified, as I have been informed that the whole thing has broken to pieces, all the men discharged, and the water running out of the tunnel, which must have cost many thousands of dollars in putting in, and now they are as far behind as ever, when good machinery might have been put in at one-half the expense that this has cost, and would have drained the mine to any depth, and now I fear the mine will be again abandoned, which will be much against the Central City, as mining in that district is going down as fast as it rose. It cannot be wondered at, to see the useless and wasteful expense that is thrown away in the foolish erections of machinery and the bad working of the mines by the American experts, who will run every mine they have the power to manage, let them be as rich as they may.—Colorado, April 28.

H. B. GIBBS.

ACCIDENTS IN COLLIERIES—THE HERMON PRIZES.

Sir,—In the *Mining Journal* of Saturday last there is a letter on the above subject, signed "A Resident Colliery Manager," and which whole tenor, with its illogical conclusions, is calculated to bring the character of the body to which I belong, perhaps you will think me to say a few words with respect to it.

I may say that, in common with many other mining engineers, I looked forward to the essays of the working colliers for the prizes offered by Mr. Hermon with a great deal of interest, wondering whether anything really new would be found in them. I was, however, greatly surprised to find that a colliery manager, and I presume a gentleman, should have so far forgot himself and his profession to which he belongs as to endeavour, for the sake of a few pounds, to wrench from the working miners one of the two prizes offered to them alone. Not only so, but that he should exultingly proclaim such sordid and selfish reasons for doing so, for he says "I am a mining engineer, and I took the trouble to write an essay in the hopes that I might gain the first or second prize." He further states that as Messrs. Dixon and Casey (who have never attained any higher position in a colliery than that of ordinary working miners) were considered eligible, "how much more should a mining engineer be eligible?" The reasoning is simply absurd. The prizes were offered to working colliers, and it would be ridiculous in the extreme to ask them to compete with mining engineers with regard to a subject which has puzzled the ablest men in the profession. Therefore, if "A Resident Colliery Manager" desires to obtain distinction surely it is not to be had by putting himself in competition with a working collier, a levelling down which may be said to be one which can bring neither credit or honour. I hope, therefore, that the "Colliery Manager" will withdraw at once from the competition, and see that he has made a very great mistake in endeavouring to wrest one of the prizes from a working miner.

In conclusion, Sir, I say the only reason I have had for noticing the matter is lest it should be thought that the mining engineers, whether as a body or individually, would endorse any departure from the path of honour which is one of the great characteristics of the profession. A MINING ENGINEER.

N. ENNOR'S REMARKS AND ADVICE TO YOUNG ASPIRANTS ON LEARNING NATURAL LAWS, AND WHO SHOULD BE THE MINE AGENTS—No. IX.

Sir,—I trust you will excuse my sending you this so late, as I have been busy getting on with my stamps, and have not had time to carry these letters out as I intended. I notice, however, that some pretending learned ones scoff at Nature's laws. I am aware such men exist: useless weeds creep into most fields when not well managed. This gives me an opening to ask such narrow-minded creatures—I cannot suppose them men—they are to me only monkeys, creatures, with no intellectual mind, and only such as should do the drudgery portion of all work. Their own remarks show they are men not in any way calculated to develop the hidden treasures so long locked up in the great store of the earth. All right-minded men are getting to see the great deficiency in even too many of England's practical captains. How many of them do we see who have worked mines all their lives and never had a paying one. Had they in early days studied Nature's laws, and followed them, they would have found paying mines ere this. These men, for want of knowing the freaks and laws of the earth, often stick to one mine all their lives, and particularly if they happen to have a house and a field or two near, when they ought to know the mine had not a single chance of becoming a paying one, and never should have been worked over five years. Were I about to bring out a mine, and to select an agent, my first question to him would be how many paying mines he had formed—one, two, or three, as may be. If he answered none, I should ask what mine he had been in, when he most likely would say that it did not meet expectations. Perhaps I should know the mine, and would give him all the lenity I could, if I saw room: but he had worked the mine far too long, and most likely had not then proved what he should have done in five years. What side lodes had he found, and what other cross lodes and freaks of nature he had discovered, that had caused him to spend such a sum on it. His answer would most likely condemn him. I might then tell him to call again.

My advice to all those speculating in mines is to select smart young agents, or older ones that have found two or three dividend-

paying mines. The old 20, 30, and 40 years agents, that never had a paying mine, are not the right men in the right place. They may be termed the unfortunates, but the fact is they are deficient in parts, and cling to their salary. I am quite aware that some inferior men at times have made lucky hits, but I never saw one of these so found paying mines but one or more of the best of Nature's freaks were found to have taken place in it. They often say that good mines make knowing captains. This I deny; it often makes good mines make knowing ones, but I have found many of them who could give them faint outlines as to the formation of ore; and they too often condemn the very freak of Nature that caused the ore to form.

It is working these unproductive mines by agents who do not know a little of Nature's laws that causes so much money to be spent in the wrong direction. I have lived long enough to discover that if I report on one mine out of ten in Cornwall as having a fair chance to become a paying one it is over the mark. Only one in forty pays in Devon, and not one in fifty in North Wales, in the so much vaunted Cardigan district.

It is the working of mines that never showed a single chance of ever being self-supporting that does the damage. This is the great drawback in mining. My advice to genuine mine adventurers is to beware how they get into mines that show little or no chance of returning the outlay. Take care you have a captain who studies his work. If so, he will show you every good point that can prove his wit in the sett, showing what they are, and the reason why he has confidence in their proving so remunerative. Beware of what may be termed "fop captains." They think but little, and write what best suits their purpose.

I was recently on Tregoss Moor, when I had occasion to go to an inn to feed my horse, where I noticed a stir among the people. They said the Duke of Argyll was coming to see Roche Rock. I ran out, and saw a splendid looking open four-wheel carriage, with two or three persons in it. I could not see the face of the one I supposed to be the Duke, but I noticed he had on the largest white felt hat I had ever seen. I thought this very fair for a Scotchman in his position to take care of his beauty, when a stander-by called out that it was not the Duke of Argyll, but only a "fop captain" of two or three little bails, who often went his rounds about midday. This rather took me aback. I asked my informant if either of his mines had paid a dividend. The answer was that they had not, nor never would. This did not surprise me, as I should have thought him far more in his place had I seen him on the mine, with his underground jacket on, and a candle in his hand. I called at two other mines near, unexpectedly, two days following, and there found the right men in their own place. They had to be fetched up. This was more like mine agents on duty. The former may have been instructed to show off, as half the mines brought out of late are not intended to be worked with a view to actual profit from genuine returns of ore: it is to collect money to be scrambled for—not by the workmen as wages for opening the mine. These men at times are presented with a piece of plate, but most times it is money, when they have settled down, and the scramble is over.

I let this suffice for the present, as I intend to ask our school-taught miner to give us a little information on electricity, and its action and effect on the earth, its lodes and veins.

I.—If it takes any, what part does it take in the formation of lodes and veins?

II.—Does it aid them in collecting and forming ore?

III.—Had it, or has it, anything to do with the shifts of lodes and the coal? If so, did the shift take place when they were formed or since?

IV.—Was electricity present when the globe was first formed, and for what purpose? Did it act as the earth's axle, and took its rotary motion, and the globe formed on it?

V.—Was the globe formed when in a still position? If so, on what day was it set in motion?

VI.—Did electricity give life to all creation, and worked under its own natural law since?

Our schools have broached so many theories on the world's formation, that I think it is only right that those paid for instructing the miner should give an open and candid answer to their theory, or the one which they suppose most feasible to adopt.

Wadebridge, May 20.

N. ENNOR.

TIN DRESSING—"PLUMBUM ALBUM" AND CAPTAIN THOMAS PARKYN.

SIR,—I do not see what object "Plumbum Album" can have in falsifying facts; it serves to show, however, the difficulties with which a writer is beset when he is compelled to have recourse to such measures. To deliberately misconstrue an opponent in controversy is proof presumptive of two things—first, meanness of disposition in the individual himself, and, secondly, his inability to deal successfully with the matter in dispute. But when, in addition to misconstruction, misquotation is practised, I have no hesitation in saying that the acme of dishonourable conduct has been reached. To change the construction of a sentence by the abstraction of words and the substitution of others is an act that can scarcely be surpassed. But if by such wrong-doing he had succeeded in making out a case we should, in spite of its moral turpitude, have been compelled to admit the ingenuity of the performance; but, as it is, it is nothing but a jumble of inconsistencies, inaccuracies, misrepresentations, senseless assumptions, and shallow conceits. If proof of this were needed the following would suffice. I am represented by this unscrupulous writer as having wantonly and maliciously assailed, and attempted to cast odium upon, the name and the efforts of a deserving man. Now, it must have been well known to him at the time he penned this that I did no such thing. He knows as well as I know that Capt. Parkyn's letters and diagram had been previously published, and that no adverse comment had been visited upon them. It was not until the whole community of tin miners in Cornwall were slurred by this injudicious patron of Captain Parkyn that any notice was taken of the matter, and, writing as I did to refute the errors which were being propagated, it was scarcely to be expected that the name of Capt. Parkyn should have been altogether omitted from my communication; and, as I could not endorse what his enthusiastic admirer had said of him, there was no alternative, if I said anything at all, but that I must dissent from him, and therefore my unavoidable allusion to him need not to have been met by so indiscreet a reply. It was quite competent for him to have been silent in the matter without sustaining any diminution of personal honour, or, at the utmost, to have quietly replied that his plans had been submitted to the public, and that he was quite content to abide the issue on the merits. But, instead of that, he rashly introduced another subject more vulnerable than the first, and put into the hands of his opponents materials with which to lacerate himself. No one but must admit that it was a very bold thing for a person of Captain Parkyn's limited experience to throw down the gauntlet to all comers in regard to mining. It is easy to be a braggart, but what then? It may sometimes provoke a retort more caustic than elegant. I remember two mine agents of good standing who were colleagues, but sometimes differed in their views of mining. On one occasion, while they were debating a point about which they differed, the one which happened to have had the worst of the argument bristled up and warmly interpolated, "I am as good a man as you." "Ah!" the other quickly replied, duly estimating the advantage he had gained by that indiscretion, "it is not so much what we think of ourselves as what others may think of us."

I do not regret the part I am taking in this discussion, as I am fully convinced that it is high time that someone should oppose the fallacies which are now in vogue. It is easy to make statements, but not so easy to verify them, especially when they proceed from impulse. We have heard a great deal of late about profits being made from mines producing very low-quality tinstone, and it is surprising that some of the affirmations made in this respect should find second and sound credence. I need scarcely say that I do not believe in the soundness of such estimates; but if I am wrong I am open to correction. Capt. Parkyn has stated, and challenged me to refute that statement if I could, that he mined and reduced ores which contained only 4 to 5 lbs. of tin to the ton of stuff, and at a monthly profit of 100%, and being apprehensive, probably, that that statement might be misunderstood he volunteered to furnish to the

Mining Journal particulars of the detail which led to such results. I confess my utter disappointment at not finding that promise redeemed, but instead a few general remarks relating to the opening of the mine, the extent to which it had been opened, and the rapid increase of the quality of the lode stuff in depth.

I expected that the promised particulars would have related to the number of men employed underground, the number of tons brought to the surface, its average value as per sample in bulk, the number of tons stamped daily on an average, and the resultant quantity of black tin monthly, and the prices at which it was sold. The number of persons employed at the surface, and whether steam or water power was employed on the mine; but, instead of details like these, which might have been instructive to mine agents generally, and have proved the correctness of the original statement. That which is given goes far to invalidate it; as, for instance, instead of the aggregate yield of the mine being produced from stuff yielding only 4 or 5 lbs. of tin to the ton, it is shown to have varied from 5 to 25 lbs. of tin to the ton, and I would like to know what sagacious miner would mine in 5-lbs. stuff if 25 lbs. to the ton was available? So far as Captain Parkyn's letter, in the Supplement to last week's Journal, goes it disproves entirely his former statement, as therein it is shown that the minimum produce was about 5 lbs., and the maximum 25 lbs. of tin to the ton, and if equal quantities of each were worked 15 lbs. instead of 5 lbs. would have been the average—a difference of 200 per cent. higher than that first stated, and one would like to be informed how loose statements of that kind can be beneficial to mining adventurers. I have for a long time felt that it was a serious error, whether intentional or inadvertent, the setting forth and recommending tin mines as sound investments which would only produce 8 or 10 lbs. of tin to the ton of stuff. I would not give 5s. per dozen for such mines. I mean, of course, where shafts have to be sunk, and engines, &c., erected; and when it can be shown that mines of this class will pay a reasonable interest at the present price of tin I will acknowledge my error, and confess that those who can produce such results have better qualifications for mining than I possess; but until then there must be something more tangible than bluster to obtain my endorsement.

MINE AGENT.

PARKYN'S "SAVE-ALL" TIN DRESSING FLOORS.

SIR,—In the Supplement to last week's Journal, the letter signed "Mine Agent" is really so unpractical, untruthful, and out of place that no one who reads it will think for a moment that the writer was sane. Fancy a man standing 40 years' storms in tea-pots. Who on earth would believe him to be a mine agent, and I ask what kind of brains can he have? and as to his untruthfulness, I will prove it by his own letter. "Mine Agent" says that he dislikes the importation of personalities into a discussion of this kind, and never resorts to them except in retaliation. Now, what did he do the very first thing? Wrote a letter to be published in a public newspaper, justly stating that that paper was read throughout the world, and mentioning my name in full, while at the same time he knows me personally, and might have communicated with me by letter. Then I say his letter is an untruthful one, and nothing to the point in tin dressing; he has not pointed out a single thing that is wrong in my "Save-All," and as to the size of grates they were never mentioned, for a good reason known to himself. Then he says that I could not have passed all the tinstuff through the tin-floors I mentioned the week before. What I said is truth, and the books can be seen; he forgets that my plan saves 40 per cent. in labour cost, on the whole, and that my life-rack will dispatch as much as six racks that are in use in some mines that are well known to the writer. Moreover, he is calculating the cost of dressing like some mines now in his immediate neighbourhood, where they land up the tyes in a wheelbarrow, and then wheel the tinstuff a considerable distance, tip it out, then it has to be shovelled into a thing, and washed in a room I build. This I saw myself not a month ago, and "Mine Agent" will advocate this mode of dressing. Would not these be antiquated modes of dressing?

I am quite aware that the different kinds of tin should be treated properly, and the rough and round tin separated from the slime, or rack or frame tin, and this I said in my first letter, when I fully explained it, but "Mine Agent," in my opinion, has a shallow memory. I am bound to tell him that I really believe that some Chinese know far more about tin dressing than he does. I do not want any building up or pulling, it is what I dislike. And I say again that I am quite prepared to meet "Mine Agent" on any subject on mining, either above or below ground, and let us compare brains. But one thing I must ask him, he must keep his tea-pot at home, for I confess I never had the experience he claims—storms in tea-pots. I mentioned a mine where 7000 lb. worth of tin was found under the boards and about the mine, and not, as "Mine Agent" says, under the boards. He is very slippery. I do not take Mr. Ennor as an authority, perhaps we might not agree in our opinion. I mentioned Mr. Ennor's name as he made the statement, and it was not contradicted. I say also that "Mine Agent" has not got a hopper in use like mine, unless he has adopted them since my plan was made public. The public will not forget that every improvement in any branch of business has first its enemies, and as I have proved my plan for nearly ten years and find it answer so well, I am willing for others to have the benefit of it. Another most important feature is that the quantity of ground required for laying out the floors would be considerably less than in mines generally. And in this a great saving will be effected. I am quite willing for "Mine Agent" to go on in his old way, as men of his stamp do not like to be moved.

May 22.

THOS. PARKYN.

THE ASSAYING OF ORES.

SIR,—I have been favoured with an opportunity of making a series of experiments, the results of which will greatly interest a large number of your readers; I, therefore, venture to furnish you with details. Hitherto, in consequence of imperfection of appliances, gold-seekers, capitalists, and investors have met with great discouragement, not because the noble metal did not exist, but that the methods of determining its existence and of procuring it were defective. Of this fact I have always been convinced; now, more than ever, from practical experience. Mr. W. T. Rickard, the distinguished assayer, recently returned from the United States, has completed what has so long been the object of research, and in his improved (patented) amalgamator and condenser the vexed question appears to be solved. Incredible amongst thousands of others, I required proof of the assumed merits of the machine. This has been afforded me. A model was produced, and its powers have been attested under my own superintendence. These far surpass the results I was led to expect. For example, the tailings from the Eberhardt Mine, duly treated, I found by careful assay to yield 13 ozs. 1 dwt. 8 grs. of silver; after exposure to the action of the machine they gave 4 ozs. 1 dwt. 16 grs., thus supplying no less than 8 ozs. 3 dwts. 16 grs., or 69 per cent. extracted from matter which has hitherto been, as I am credibly informed, regarded and treated as valueless. I am now engaged in a series of experiments upon gold ores. The results shall be duly communicated. I will simply add that thus far the results promise to be equally satisfactory.

Finsbury-place, May 22.

W. WHITE.

DRESSING OF ORES.

SIR,—For some time past I have observed in your Journal a lengthened correspondence regarding the cheapest and best method for dressing and washing ores. Some of the inventors go in for tin, others for copper, lead, &c., but I have not observed any one refer to the dressing of iron ore, which is now required in such vast quantities to supply our increasing trade in the article of iron. It is well known that iron ore should be delivered to the ironmaster in as pure a state as possible. Pig-iron cannot be made from silica, alumina, or any other gangue found in all ores. The metal in the ore only can be turned to profitable account, and hence the necessity of sending it to the ironworks in the highest state of purity. The cost of transit being a very serious item connected with the removal of the ore from the mine to the furnace, smallness of bulk containing a maximum percentage of metal should be the aim of the producer of the ore.

I am led to bring this subject before your correspondents who

direct their attention to ore-dressing machinery in consequence of the frequent complaints of ironmasters that iron ore is often delivered to them in a very dirty state, without any previous washing done to it to take away the impurities contained when raised in the mine. In the County Antrim a very extensive district, containing vast quantities of superior hematite iron ore, has within the past three or four years been opened out. The matrix of the ore is principally alumina, with a small quantity of silica.

The ore is found generally in a soft decomposed condition, mixed with clay; it is called a psolitic ore, arising from the iron of the ore being in the form of a pebble, varying in size from small shot to that of a horse-bean; large quantities as raised crumble into dust, and the hardest parts could be easily crushed by ordinary crushing-mills. I am disposed to think a very extensive field is found here for the ingenuity of many of our machinists who devote their attention to the best means of dressing ores economically by machinery; and as one taking an interest in the development of the resources of our home mines, I should be glad to see this subject discussed in the pages of the Journal. The high price of coal has considerably increased the cost of manufacturing iron, and consequently necessitates the ore being sent to the furnace containing the minimum of impurities.—Belford, May 21.

SILAS EVANS.

MINES, HOME AND FOREIGN.

SIR,—Observing an enquiry from "Speculator," under the heading of Notices to Correspondents in last week's Journal, as to where the mines I have named as capable of paying cent. per cent. on the capital required for working them can be seen, I would name West Lisburne, situate about one mile west of Grogwinion, and two miles west of Frongoch. In the former of these properties they are open-out a good and lasting dividend-paying mine; and in the latter, under the deepest mine in the county, the bottom level, 124 fms. under adit, is in one of the richest courses of ore ever seen at that extremely rich and profitable mine. Again, I would point to West Esgair-hir, as a property safe to return cent. per cent. on the working capital. This mine is situate two miles west of Esgair-hir, where they are now opening out on courses of solid lead ore, varying from 2 to 3 ft. wide; and on Thursday last, in company with Capt. Pryor, of Mold, I saw at surface the very best pile of silver-lead I ever saw raised in this county. The third, and last, I shall now name is the South Esgair-hir, and which was inspected by Capt. Pryor. To give an idea of his opinion of this mine, in reply to a question I put after our visit, as to what he thought of it, he said "I like it as well as any mine I have seen in the county." If "Speculator" will forward me his card and address, it will afford me great pleasure to go over these mines with him, and afford him all the information about them in my power; and I do not after his inspection he will be able to appreciate more fully than he has yet done my remarks on "Home and Foreign Mines."

In conclusion, it gives me great pleasure to be able to inform you that in addition to the great—I may say magnificent—discoveries made at Esgair-hir, Grogwinion, and Frongoch, most excellent discoveries have also been made at the Llwyn Teify and the Aberystwyth mines, and that mining in the county is looking more prosperous than for very many years past; in fact, where capital is fairly expended good results cannot but be obtained; and no mines in the kingdom are more deserving of capital, or can be worked so easily and advantageously, as the mines of Cardiganshire.

Goginan, Aberystwyth, May 19.

ABSALOM FRANCIS.

HOME MINING—A LUGUBRIOUS VIEW.

SIR,—Brilliant as things have been put forward the last two or three years on paper, with regard to puffing speculations, the balance-sheet at the end of 1873 will unfold a sad disappointment to many investors, who are charmed with high sounding names as directors, and whose experience in such undertakings is nil. Mining, as a rule, requires experience in guiding such an incomprehensible pursuit to men whose occupations and thoughts go no deeper than the surface, hence the immense losses in what are termed mining investments; and unless a speculation is brought out at an immense premium the stock is thought nothing of. Some 40,000, or even twice the sum, is frequently swallowed up in preliminary expenses, and little or nothing done for the money. These observations not only apply to the notorious foreign El Dorados, but many "home investments" so called, are little or no better. Men who write fiction that reads like truth frequently succeed better than the plain matter of fact persons; but mark the end!—1825, 1835, 1845, 1855, and 1865 were all years of insanity, with a few ups and downs intermediately. The crying evil is, and has been for years past, that the granters of sets are so narrow-minded that they give little or no encouragement to home speculations. At the coming elections candidates should be questioned on this point strictly. Many of them know not their own interests, or their country's good. What is become of the once flourishing copper mines of Great Britain? The result is no new mines are being discovered, and no encouragement offered to investors to lay out their capital, for years previously, and at a very great risk of seeing a penny of such money expended in explorations returned to them; the enterprising persons are leaving this country and exerting themselves in foreign parts. If a person applies for a set of obstacles are constantly thrown in his way, as the writer can prove. More expensive explorations are said to cast their shadows before; but these shadows lie deeper in the earth than in new countries. I am alluding to the British Isles, where great industry has been the parent of fabulous wealth in the case of gold; but, alas! these days of sand have faded and passed away, and little or no effort making to bring about a return of the good old days. Trustees and widows complain that they get no royalty or dues. How should they? The reason why is very clear. I have been nearly two years trying to get a lease of some property to bring before the public—but, nothing but wait, wait, wait, for some reason or another. In a very few years, from new countries, which are fast opening up by railroads, Europe will be inundated with foreign metals of every description. Mexico, if properly developed, can more than supply this country with tin ores, Spain with lead ore, and South America with copper.

When myself and a few other gentlemen started Trenow Consols, Alfred Consols, the Wellington Mines, Tolvadden, with two or three other tin and copper mines in Cornwall, the whole of the outlay did not amount to more than 50,000, and these mines all recouped themselves in a short period, and paid the investors about 200,000. In dividends, and the mines marketable at twice the amount paid in dividends. Mark this, investors, and compare mining now-a-days: mines selling at hundreds of thousands of pounds in the market which never paid a dividend honestly got, neither are they likely to; but some say anything is worth what it will fetch. A sad state of things in the end, as people are beginning to find to their sorrow.—London, May 21.

A. BENNETT.

MINING SHARES—ADVERTISED AND QUOTED PRICES.

SIR,—Your issue is evidently, if I am to judge by the last, No. 1969 (divided by 52 weeks) about 33 years old, and should be regarded, therefore, as entitled to take the highest rank as a mining authority. There is a mass of information, both with regard to British and foreign mines, metals, meetings, and reports, second to none which I am in the habit of reading. I cannot but regret, however, that the prices of mining shares should be open to occasional doubt, by reason of your obtaining the notices of sales not always from dealers in an open market, where buyers' rates and sellers' rates should have some fair relation to each other, but from sellers who have the power of effecting sales at fabulously high prices, while your advertising columns show that others declare they are holders and sellers at fabulously low ones. I pass by the shares in one mine, for instance, though in your price list these are quoted at 5½, 5½, because, though they occasionally appear in advertisements at much less, there is evidently nothing so striking in the repetition as to provoke general amazement; but in the case of another mine I may be forgiven for making a halt. These have been sold by some folks, and I could mention names, at from 4½, 5, but are now priced (by whom?) at 2½, 2½. Why, by all that's fair and aboveboard, can this be? And yet your advertising columns teem with offers at from 8s. to 10s. lately, to at most (say) 18s. What is the honest truth of the case? The one or the other should be exposed. Surely those who can boldly proclaim themselves in love with this mine should have some better method of ridding the market of the depreciators of this stock than the mere knack of covertly abusing them. Why does not the seller at 2½, 2½ offer to buy from anyone who can purchase from the depreciators; and offer to bind himself, if he be a monied man, to buy from all such as will sell at a price he will publicly name? It strikes me that it would materially serve the general public if you could contrive to publish on one page the mines for which prices are quoted in the open market or Stock Exchange, and on another page those mines which are simply dealt in by outsiders at whatever they can get, stating the absolute authority for the prices therein quoted. I know one dealer certainly, and there may be many, who, though it is possible for him to say my price is so-and-so, would treat it as a joke to be placed aside by the quill pen. "I am not a buyer," and offer to bind himself to re-sell him the very shares he sold them at half the price he occasionally tries to convince a new buyer they are honestly worth.

I observe occasionally as glowing reports, or Mining Notabilities, in your columns statements which have the smack of individual outside "bulls" of this species, who, screened from the exposure of their names, may luxuriate, for instance, in any quarter of the City, it is immaterial to me where, but whose chief function would appear to consist in putting into the "seventh heaven," as it were, some horrible conceits which are to re-appear as quotations "from the Mining Journal," and to help the public to buy shares which the balance-sheets of the concerns referred to would show to be almost hopelessly rickety—come, per hance, struggling to avoid for the moment the winding-up process, which would reveal the fact that the capital is gone, the "plant" mere "moonshine," the "indications" a "sell." Who has not observed the plight of one mine, the letters touching a second, the modest reticence of a third, the silence as to a fourth, and noticed all

this the more as he recalled the glowing panegyrics in regard to one and all of these followers in the wake of the Van de Veen Consols?

I do not mention these for the sake of drawing special attention to any one man or body of men who are known to have advocated and still to advocate any one or other of these mines, so much as for the sake of calling your attention on behalf of the *Mining Journal* and the general public to the crying necessity there is for some check which it may be possible for you to prepare against wifal traders in general on mining credulity. There is great need probably within the charmed circle of the Mining Exchange for the output of some effort to show from time to time what can honestly account for a rise or fall in prices. In railways, banks, and other commercial undertakings we can generally see public opinion directed by public and well-authenticated facts, especially for any serious change in market prices; but who can see such a state of things as mines quoted at 2½, 2½, in the same public organ of values contrasted with 8s., 10s., or 18s., or at 5½, 5½, and, it may be also, 2½, 3½. There is something rotten in the State of Denmark. Forgive me another remark, and I have done. Correspondence such as "Japhet's" savours more of personality and word-mongering than of sober science. It may be provoked by something personal on the other side,—no matter. Let the "broker in Gracechurch-street," so much referred to, fight his own battle—that will be best fought by the facts he can produce for fair commercial men to consider, and if he be a miner, either of ancient or modern training, the clients he has would rather see him committing himself to an open vindication of his various treasures than to a mere bandying of words of ridicule at the hands of any clever "Japhet," though he dated his epistles from an Ark, or had authority from Noah himself to drown his enemies with the choicest rhetoric. I observe that "A. F." agrees very much with this.—*Arrivet, May 21.* PRO BONO PUBLICO.

It has frequently been explained that in shares, whether mining or other, it is impossible to bring the quoted price and the intrinsic value into accord with each other; all, therefore, that can be done is to give the prices at which sales have been effected, taking care that such sales are properly vouched. "Pro Bono Publico" admits that the sales take place at the prices we publish, by declining the existence of "scissors" who have the power of effecting sales at fabulously high prices, and he does not attempt to prove that any business has been done at the lower price he mentions. It is, moreover, a general principle of business to make a public offer to clear the market of all commodities which the majority consider command too high a price; and in the case of industrial securities of all kinds the purchases are usually made upon the prospects as estimated by the purchasers, more especially when the concerns are not in regular dividend-paying condition. Thus, Devon Great Consols, to which "Pro Bono Publico" alludes, are quoted 6000 per cent. premium, yet no dividends are expected for a year or two, and calls are not improbable; but purchasers rely upon the prospects, and will, doubtless, be well repaid for their confidence. Some shares in which dealings almost hourly occur in the Stock Exchange or Mining Market can be quoted to the fraction, and the prices will be readily obtained through any broker, whether it be desired to buy or to sell; but where the dealings are few, or confined to a limited number of dealers (say a Leeds, a Glasgow, a Liverpool, or a Salisbury connection), sales in the open market would be altogether impracticable, and the attempt to effect them would be as disheartening as the attempt to sell any commodity at retail prices to the manufacturers of the same class of goods. Inability to sell at quoted prices does not invariably prove that too much is asked, and many mines which are almost privately managed, so that shares in them would be quite unsaleable in the market, have a value set upon them by those interested, which experience has taught them is not at all exorbitant.

THE SCIENCE OF INVESTMENTS.

SIR.—What is the Future of Cornish Mining? The latest quotations in your valuable columns of tin were 140L to 142L, and of copper 100L per ton. West Wheal-Setton dividends has had to make a call of 7L 15s. per 400th share, the loss the past 12 months having culminated in a debit balance of 310L, while the market value of the entirety has declined to 12,000L. East Pool has a debit balance of 525L outstanding, yet a dividend of 2s. 6d. per share was declared at the recent audit. Why not have made a call, as in the case of West Seton? It is true that West Seton has passed into your calling list, still East Pool remains among the dividend mines. Surely the financial position of the two properties are somewhat analogous. The public appreciate the true position of the two mines, and with all the bolstering up East Pool has declined during the current year about 40,000L in current value. Again, East Basset showed a loss of 1947L on the quarter, and involved a debit balance of 2173L. There was much dissatisfaction expressed at the meeting. Is this mine an existing property, or is the future wholly a speculation? The workings involve an annual loss of (say) 5847L.

Again, West Frances has a debit balance of 591L 19s. instead of a credit in favour of shareholders? Pray why should this mine remain in your Dividend List, and be saleable at 22,500L? The outlay has been 26L 13s. 9d., and aggregate dividends 2L 13s. 6d. per share, yet the mine has been at work for 35 to 40 years. Cook's Kitchen, also, is working at a loss of about 150L per month, although it took 50 years to change from copper to tin. The dividends of Dolcoath last year were 10L 12s. 6d. a share, and for the past three months only 1L a share, while the market value has become depreciated about 70,000L, since the close of 1872. The general complaint is the high prices of coal and materials and of labour. Will the former ever recede to the old and normal values? I say, No. And will emigration of miners cease from Cornwall to America and other countries? To say the least of it, the future is highly against home labour. Hence, in conclusion, we must have higher prices for metals and lessened dues, or shareholders and landlords will find capital directed to other branches of home industries.

The Van, as predicted in my Annual Review in January last, is all but certain to "cap" the dividend mines for 1873. The first quarterly payment having been 12,000L, or 273 per cent. in comparison with the "Veteran tin mine" of Cornwall. It is stated that operations were carried on for 15 years to effect the transition from a non-dividend copper to a profitable tin property. Tincroft quarterly dividend of 9000L places this company at the head of Cornish mining enterprise. Again, Carn Brea dividends, at the rate of 12,000L annually, render the shares cheap at ruling quotations. The introduction of the four-weeks settlement, or 13 months to the year, has effected no good among the workmen. The miners continue to emigrate, and though Captain J. Thomas is said to have stated that he knew of many men earning 6L a month (say 78L a year), yet a spirit of growing dissatisfaction prevails, and great inconvenience is felt from the already scarcity of labourers: 30 years ago tutworkmen were content with 25L to 30L a year, but then fish and vegetables were exceedingly cheap—i.e., pilchards 20 for a penny, mackerel 12 to 20 for a shilling; hake and cod-fish were abundant, and at the command of the most necessitous. What are the progressive mines in Cornwall doing? Is South Corndurow again to appear in the Dividend List, and when? This property sells for 42,000L—the highest market value of any mine, save West Basset, standing to the south of the Carn Brea Hill. Basset declared a dividend of 30s. per share in August last year, but I am not aware of a single dividend from any one of the many properties extending from Camborne to Gwennap during the current year, and situate within this range. In fact the present aspect of Cornish mining tends wholly in one direction—namely, retrenchment—and the first duty of landlords is to lessen the dues. The dues at Dolcoath were 950L, and the profits only 4182L, rather more than 23 per cent. Is it not monstrous that the landlords should receive such a slice of the produce, even out of our greatest and most brilliant prizes? And if such be the tax on the best dividend mines how much more severely must the impost be felt by the struggling and non-dividend undertakings—as, for example, Botallack, South Crofty, West Tolgus, South Frances, Providence, St. Ives Consols, West Seton, Seton, North Roskear, Crenver and Abraham, Margaret, and Great Wheal Vor. Yet, notwithstanding all the heavy costs and taxes on Cornish mining, there is a clear lining tinging the clouds that depress enterprise in them; while practical authorities can point to several neglected properties that must soon become recognised, as from discoveries already made and promising points soon to be achieved, they will assuredly enter the Dividend List. R. TREDINICK, 32, Fleet-street, London, May 21. Consulting Mining Engineer.

EMMA MINE—"CIRCULAR MINING."

SIR.—The following are extracts from a monthly publication, by a consulting mine shareholder, and may be now referred to as evidence of the value of advice which has been offered to intending investors:—

In November, 1872, he writes:—"Emma Silver (Limited). In 50,000 shares (fully paid)—present price, 22L to 23L. This mine has just paid its twelfth monthly interim dividend, at the rate of 18 per cent. per annum, and is now producing ore of far greater richness than heretofore. We believe these shares will advance in value, and are, therefore, worth buying as a speculative operation."

In December, 1872, he writes:—"Emma Silver (Limited). In 50,000 shares (fully paid)—present price, 22L to 23L. This mine has just declared its thirteenth monthly interim dividend, at the rate of 18 per cent. per annum. The recent developments have opened out a richer grade of ore than any previously discovered, that extracted from the bottom of the mine yielding from 8150 to 8250 of silver per ton and about 50 per cent. of lead, value between 45L to 50L per ton."

In April, 1873, he writes:—"Emma Silver (Limited). In 50,000 shares, 10L (fully paid)—present price, 9L 10s. to 9L 15s., dividends in abeyance. In justice to ourselves we deem it right to direct attention to the fact that long before there were any indications whatever of the serious collapse in the market value of the shares we were counselling those of our readers who were shareholders to realise, as the

information within our knowledge was of such a character as to leave no doubt in our minds that a heavy decline in the price of the shares was inevitable."

In May, 1873, he writes:—"In 50,000 shares, 20L (fully paid)—present price, 6L 15s. to 7L. We do not profess to be prophetically gifted, but the information we receive from our private agents in the different mining centres enable us to form pretty correct estimates as to the commercial and investing value of the various mines introduced from time to time to the notice of the public. The practical value of such information has been of pecuniary service to those of our readers who were induced to subscribe for the Emma shares at their par value—20L. We have always contended that the shares were never worth the price, and the result has proved the correctness of this opinion." Can assurance further go? N.

MR. PARK, AND THE EMMA MINE.

SIR.—Some of your correspondents have already drawn prominent attention to the communication recently addressed by Mr. Park to the shareholders in the Emma Silver Mining Company, and much discussion, I see, has resulted therefrom relative to the "explanations" which Mr. Park has put forth as to his connection with the purchase of the mine and its sale to the present company.

It is evident that many of your correspondents are well and fully informed upon this and other points in connection with the inception, progress, and position of this now historic enterprise, but for their further information allow me, Sir, to supply some missing details, which should be known at this most important juncture in the career of this company.

The following facts, elicited from Mr. Park under oath, before Vice-Chancellor Wickens, throws some curious light upon matters which at present are not very clear to the minds of the shareholders:—

MR. PARK (cross examined by Mr. HAWKINS): I came here in September last. I made a sale of one-half of this mine for 400,000L, which I put down in the market at 1,000,000L. I sold one-half absolutely by verbal contract for 400,000L, which would be 1,000,000L, less than half. It was proposed to put it on the market here, and to offer it to the public. The parties to whom I sold it, after negotiating for some time, perhaps from four to six weeks, and getting their report, introduced me to Mr. Grant as taking this contract off their hands. Mr. Grant took the contract by agreeing to pay me the 400,000L, which he did, and dividing with the party who proposed it to him, he paying all expenses of promoting, and he having the avails of the one-half, at the same price that the parties with whom I originally negotiated were to have it—to wit, 400,000L, net, he paying all expenses, and dividing in his way with the parties who had introduced me to him. After I had made this trade originally, when first I arrived here, in September, the mine had increased much in value by further developments, until it is double or quadruple now what it was at the time it was offered on the market. That accounts for the enhanced value of the shares at the present time—from the further development of the mine. Mr. Grant pressed this and made those disbursements, and received his 100,000L for it after it was all concluded.

MR. HAWKINS: Do you mean that he received 100,000L further?—MR. PARK: No, 100,000L net. When you ask me what I paid in the promotion of the mine, we purchased 5000 shares of the stock (shares), as is always done in promoting all property new, whether it is Government Stock or Bonds, I believe, in London. There were 5000 shares repurchased—I paid for those shares: that was when I paid another 100,000L, and then they were my shares. After the original one-half, or 25,000 shares, which were offered to the public had been taken, Mr. Grant showed me his account, from which he showed me that he had received less than 200,000L, or less than 2 per cent. on the whole amount, for his services, after deducting the disbursements which he had made. All this was the original contract with Mr. Grant.

MR. HAWKINS: I am asking you a simple fact—whether or not you paid him 100,000L, and you say 200,000L. Did you pay him anything in cash?—MR. PARK: Yes.

MR. HAWKINS: How much in cash?—MR. PARK: The whole 500,000L, paid by the company was paid to me. I gave Mr. Grant his 100,000L, which reduced it to 400,000L, and also gave him my cheque, which I think was nearly another 100,000L, for the shares which belonged to me, after he had purchased the mine, and that made nearly 200,000L, I paid him.

MR. HAWKINS: How much has he kept of that 200,000L?—MR. PARK: He has shown me about 20,000L, or very little less, and I thought it too little, and I made him a further consideration after we had gone all through.

MR. HAWKINS: How much?—MR. PARK: By giving him a commission on the other shares I had. MR. HAWKINS: What does that come to?—MR. PARK: I don't set it. MR. HAWKINS: About 2L?—MR. PARK: I cannot tell. MR. HAWKINS: Within 20,000L?—MR. PARK: No, I cannot tell. MR. HAWKINS: Can you tell me within 50,000L?—MR. PARK: I think it might amount to from 20,000L to 30,000L, for the reason that it was contingent upon what the shares sold for, and the shares increased in value in consequence of important developments made in the mine after it was put on the market. The mine is worth five times to-day what it was when first offered to the public.

Mr. Park here states under oath that the mine had quadrupled in value since he sold it to the British public. If this be the fact, will Mr. Park kindly inform us the value of the mine when he sold the property, for if it had quadrupled in value, as he stated, it is clear that when he sold it the mine must have been worth many hundreds of thousands of pounds less than nothing.

For the further information of those interested I subjoin a copy of the original contract made between Mr. Park and the stockholders in the New York Corporation, of which General Baxter was the chairman:—

Whereas, the undersigned were owners of stock in the Emma Silver Mining Company of New York, as follows:—H. H. Baxter, 10,875; Warren Hussey, 5129; Robert B. Childholm, 5210; James Smith, 3924; J. R. Walker, 963; Samuel S. Walker, 965; D. F. Walker, 965; M. H. Walker, 965; Francis D. Cliff, 965; M. M. Cunningham, 226; Wm. M. Stewart, 5000—34,960 shares. And whereas the Emma Silver Mining Company aforesaid, represented by T. W. Park, has sold its real and personal estate to the Emma Silver Mining Company (Limited) of London, according to the terms of an agreement made by T. W. Park, represented as aforesaid, and by said agreement the vendor was to receive the proceeds of (25,000) twenty-five thousand shares of said company in cash and the same amount in stock—to wit, twenty-five thousand shares. And whereas, the undersigned are entitled to receive from the fifty thousand shares in the Emma Silver Mining Company (Limited) the following number of shares, or the proceeds of such shares—to wit:—

[Here follow same names and number of shares as above.]

And whereas the said Park has contracted to pay, and has paid, large sums of money in selling said shares or portions of them, and has given his time, and proposed to give his time in the future, to the sale of the shares until they are all disposed of.

And whereas the shares of said Emma Silver Mining Company (Limited) not sold are to be deposited with J. H. Puleston, or such person or persons as may be agreed upon between Messrs. Grant and Co., of London, and said Park, until the same are sold, and when sold the sale or sales are to be on joint account of all the owners of shares, and the proceeds to be divided *pro rata*. Now, in consideration of the premises and the services hereafter to be rendered by the said Park, we agree with the said Park as follows:—

1.—That the said Park shall attend to the sale of said shares in which we have an interest, and shall pay all commissions and charges which he has agreed to pay, or may hereafter agree to pay; and as fast as said shares are sold shall pay, as on the shares we own, or are entitled to the proceeds of, the sum of 850 per share, in United States currency, by draft on New York, sent to us respectively by mail within fifteen days after any sale of shares, and on those already sold, within fifteen days from the execution and delivery of this agreement, paying the undersigned on each sale, as it may be made, his *pro rata* on the shares sold, without any rebate on such shares sold and to be sold, together with any dividends that may be payable thereon before the said sum of 850 per share, to be paid as aforesaid on the shares, set opposite our names respectively in this agreement. And we hereby agree, in case of a deficiency in the 2800 tons of ore sold with the mine, to pay our proportion of such deficiency, and we hereby authorise said Park to retain from the 850 per share to be paid us as aforesaid our *pro rata* of the sum or sums necessary to make up such deficiency; and we further agree to pay our respective proportions of all court and legal expenses to defend all suits now pending affecting the title to the Emma Mine, in order to make good Park's guarantee of title to the Emma Silver Mining Company (Limited), of London.

2.—If the said Park shall at any time and at any time to us respectively any sum beyond what we are entitled to receive he may deduct the same from the next amount due to us from the sale of shares.

3.—This contract to exist for one year, and any shares then remaining unsold shall be delivered to us respectively, as we are entitled to the same.

In witness whereof we have hereunto set our hands this 9th day of December, 1871.—H. H. BAXTER, &c., &c., &c.

I hereby accept the above contract, and agree that the parties above described shall not be called upon for any sum for my services or disbursements except as expressed in said contract, and I agree to carry out the agreements hereinbefore mentioned to be performed by me.

In witness whereof I have hereunto set my hand this 9th day of December, 1871. T. W. PARK (By his attorney in fact, Wm. M. Stewart).

Is not Mr. Park's statement opposed to common sense to suppose that the original vendors would have entered into this contract to sell their interest at 10L per share, payable when sold to the British public, and allowing Mr. Park the enormous expenses he claimed for floating the company? Mr. Park has said that he did not know Professor Silliman personally, but that he was selected by the representatives of the purchasers of the property. If Mr. Park were really as ingenious upon this point as he would have us think he is, he would have stated who really did employ Mr. Silliman, and upon what terms he was employed. Mr. Park does not state that Professor Silliman was unknown to General Baxter. Mr. Park perfectly well knows that at the instigation of General Baxter, a certain ex-judge, who knew Professor Silliman personally, made the arrangements for Professor Silliman to visit the mine and report thereon. As Mr. Park brings out this point in bold relief, presumably, it may be supposed, to remove the onus of responsibility from himself, would it not have been as

well if he had told us whether the Professor's fee was absolute, or whether a material portion of it was not dependent upon the sale of the mine to the British public? Is it not a fact that nine-tenths of the sale of Professor Silliman's fee depended entirely upon the success of the sale? Mr. Park, in an affidavit, has affirmed that the success of the sale was a full partner with him in all his transactions in the sale of the Emma Mine; if this be so, how is it that General Baxter appears as joint-seller of 10,875 shares? Was General Baxter a seller to himself and Mr. Park, his partner?

Without the additional light thrown upon the matter by the legal evidence above quoted, it was difficult to understand Mr. Park's statement that he was continually buying shares, not with the view of the mine. We now see that Mr. Park's statement is perfectly true as far as buying the shares, and also that they were not purchased to support the market; but it is quite apparent what the object really was—to give the shares a fictitious market value! Why, then, Mr. Park, in his penitence, not only so infinitely silent upon this question, but (as one of your correspondents has fitly observed) in that which he has stated "suggests falsehood by the suppression of truth?"

These have become questions of vital importance now that the shareholders are about to be asked for additional capital, to pay Mr. Park the advances made by him to the company to enable it to continue its regular monthly dividends, by which credulous shareholders were misled into the belief that Mr. Park's statement, given under oath, was really true—that the mine had actually quadrupled or quintupled in value since he exercised an abnormal self-abnegation by sacrificing it to the British public for such a nominal amount as 1,000,000L.—May 21. ONE BEHIND THE SCENES.

THE EMMA MINE.

TO THE DIRECTORS AND SHAREHOLDERS OF THE EMMA MINING COMPANY (LIMITED).

It will be remembered by many of you that, at a meeting of shareholders held in May last, when the astounding reports made by the Hon. Brydges Wiliams, Hon. W. M. Stewart, and B. Silliman were read by the Chairman, Mr. Moscrop made a few remarks, stating that Mr. Park had informed him I was a "bear" of 1600 shares of the stock—that I had so told Mr. Park—that I came to him (Park) and begged for the stock—that I had a letter from Salt Lake, saying that the shares would reach 100L—that most extraordinary looks of ore had been discovered, and that unless Park would accommodate me I was ruined, &c.—Mr. Park had left for New York before the May meeting. Now, I had made no public demonstration before this to depreciate the value of the stock, but my indignation was aroused in consequence of the statements made by Mr. Moscrop, and I acted accordingly. The facts in connection with this matter are as follows:—I did sell about 1200 shares of the stock as soon as I learned Mr. Park had disposed of the whole of the vendors' shares, less 25 shares, which were retained by the directors to make them eligible officers. Mr. Park asked me in confidence what amount I had sold. I replied that if he would not mention it to anyone I would tell him. He faithfully pledged to keep the matter a secret, and I gave him the information. I asked him if he could procure me 1000 shares, and I would pay him the market price; or, if he would borrow them for me, I would give him the money. His reply was that he had no stock whatever, except 500 shares he had purchased a day or two before at 27L 10s.; that he had promised 200 shares Mr. Doyle, a director, and would sell me 300 shares at the same price. These shares I purchased. I had received no letter from anyone saying that the shares would go to 100L, nor did I state any such thing to Mr. Park, or that I was ruined, &c. This was simply one of the many tricks and artifices used by Mr. Park to depreciate the value of the stock.

On that occasion (the May meeting) I asked permission of the Chairman to reply to Mr. Moscrop, who seemed disposed to indulge in insinuations and statements of a very unjustifiable nature. My request was granted, and I then recounted the facts which had come under my observation, speaking of many things from personal knowledge. I was the first one to allude to the adverse claims which would necessarily arise, and which Mr. Park and myself had discussed on several occasions. I also referred to the iniquitous proceedings connected with the sale of the Emma Mine to the English public; to the employment of Prof. Silliman, Bridges Wiliams, and Mr. Lawrence, to report upon the mine, and to the prices paid for these reports, also the sums paid to many of the promoters. I had full knowledge of the value of the mine, as immediately previous to the sale I obtained an order from the Court in Utah to permit me, with my attorneys, a skilful mining engineer, two assistants, and six mining experts, to make a thorough examination and survey of the mine, which was done. Immediately after Mr. R. W. Raymond, the United States Geologist, examined the mine, and gave me valuable information, corroborating my opinion that the mine was simply a chamber of ore, and nearly exhausted. The statement made by Mr. Park to me before he visited London, that the mine was nearly exhausted, and that he did not think it worth more than \$250,000, but that it could be sold here on its previous reputation as a rich mine, confirmed my own impressions of its value. I sold the shares with this knowledge purely as a speculation.

I have been denounced by directors and shareholders as attempting to depreciate the value of the stock maliciously, and with false statements and telegrams. But time has verified the truth of all I have said about the mine, and many who were loud in condemning me a year ago are now painfully realising that "facts are stubborn things."

It is poor consolation, perhaps, for damaged shareholders to reflect that they were induced to purchase Emma stock because persons in high official stations of England and America were lending their names and influence to the scheme. It is certainly to be regretted that one occupying Gen. Schenck's high position should have even indirectly aided in foisting upon the public a speculative enterprise which has turned out so disastrously. But he was deceived, as many others were, and has, doubtless, long since regretted the part he was led to play in the great Emma farce. It is not difficult to predict the end. The recent action of the Emma directors certainly "points a moral and adorns a tale." It may be interesting to enquire whether the directors in exercising their borrowing powers intend to draw upon their own personal resources or those of the company.

In all seriousness the Emma bubble is a national disaster. America offers many profitable fields for the investment of English capital, each and all of which must suffer because of this gigantic swindle. It is only by a prompt and unqualified condemnation of the iniquity practised by the vendors of the Emma that Americans can relieve themselves of the national reproach thus fastened upon them.—*Lougham Hotel, May 23.* JAMES E. LYON.

UTAH SILVER MINING COMPANY.

SIR.—This company was formed for working mines at Utah, with the enormous capital of 140,000L, and its scrip was issued Jan. 31, 1872, of which I am a holder. On Feb. 28, 1873, special resolutions were passed to wind up the company, and since then a new company was formed, called the Utah Silver-Lead Mining Company (Limited), to work the same property, after the wreck and disaster that befel the old one. As a shareholder, I was opposed to the management of the old company, and the constitution of its board of directors in whom I had no confidence, as their interest appeared more devoted to raising the price of shares, regardless of the intrinsic value of the mine, and at the same time manifesting the utmost indifference towards the shareholders by withholding reports of the mine from appearing in the *Mining Journal*. Other well and legitimately conducted mines have weekly reports in the *Journal*, but the Utah Silver-Lead have only a few lines of consolation in your money article, informing that that now is on the ground, or that finances are not complete. Is it not surprising that no report has been issued or seen in the *Journal* during the last three months?

THE BODMIN DISTRICT.

SIR.—The above district is nearly the best customer of the Stannary Court in all Cornwall. A few months ago we had Hammett and Reperry, and now Ternes and Belovada Beacon; and yet this district has always been the best-puffed one in the county, and has yielded more failures than any other. My note-book tells me that in the last 20 years no less than 32 mines have been worked in the Bodmin district, and that 24 have proved utter failures, while none of the rest have paid permanent dividends. How is this? It cannot be caused entirely by the non-productiveness of the lodes, because several mines of the district have been worked with some success by individuals. Is not, then, bad management at the bottom of it all? In speaking of the Bodmin district, I mean the parishes of Bodmin, Withland, Caradine, Lannivet, and Lannivory; but not St. Blazey, which has yielded some excellent mines. From time to time we have had able accounts in the *Journal* of

East Pool is of considerable advantage to South Crofty Company, in enabling them to facilitate the working of some very productive mineral ground. Capt. Thomas said if tin held up to the price it was at their last meeting the entire debt balance would have been wiped out. The proposed agreement with East Pool Company was confirmed, and 2s. 2d. per month added to the salary of the junior clerk of the mine, Mr. G. Luke. There was a very good feeling evinced by the shareholders respecting the prospects of the mine, and the very able way in which it is managed. The accounts also are brought up as close as possible, and contrast most favourably with other mines in the district, which are not charged up so close by three or four months; and which, instead of having a large balance in hand, as shown on the face of the accounts, are in reality several thousand in debt.—*Western Morning News.*

SOUTH WALES INSTITUTE OF ENGINEERS.

[Continued from last week's Mining Journal.]

Mr. BARROW's experience with compressed air led him to believe that the temperatures given by those experiments were, to some extent, due to the friction of the pistons in the air-cylinders, and not altogether to the latent heat in the air, and asked Mr. Snape if he had made experiments to determine this?—Mr. Snape said his experiments went to show that at a piston velocity of 160 feet per minute, the increase of temperature, due to friction, was 20°.

Mr. THOMAS FORSTER BROWN said that the experiments showed this result at a piston velocity of 160 ft. per minute, but at the higher velocities it did not appear what increase of temperature was due to friction.—Mr. Snape said the temperature seemed to run up at once to a certain point, with a given pressure, and during continued working afterwards at that pressure the air increased in temperature very slowly, and this increment was probably due to friction.

Mr. COPE PEARCE said that, if he read Mr. Snape's diagrams correctly, about 8-10ths of the power applied by the steam-engine in compressing the air on the surface is utilised by the air-engine underground, if the back pressure is included. But, of course, to arrive at the effective horse-power or work done by the air-engines, the back pressure should be deducted, and when this is done it is reduced to 123-horse power, or about 73.3 per cent. of the power applied on the surface. This is really what we want to arrive at, and the compressors and compressed air can only be treated as the intermediate parts or agents for transmitting the applied power. It is also to be observed that the diagrams of the compressors show an unexpected pressure of about 4 lbs. per square inch. At the beginning of the stroke air at the atmospheric pressure compressed into 2-7ths of its original bulk would be about 39.5 lbs. pressure, but one diagram shows this pressure to take place only after 5-7ths of the stroke, although the pressure commenced at 3 lbs. above the atmosphere; this may possibly be accounted for by leakage past the air piston. In respect to the increase of some 4 lbs., indicated by the compressed air at the bottom of the pit in excess of that on the surface, the weight of the column of air equal to the depth of the pit (365 yards), and compressed to 37.5 lbs. per square inch, is not sufficient to account for it; but Mr. Snape's statement is confirmed by other experiments, one of which at Rhyhope gave 40 lbs. pressure at the pit top, 46 lbs. at the bottom, a depth of 518 yards, and 45 lbs. at the hauling engines, after the air had travelled a total distance of 1505 yards. It would be desirable to know whether the pressure of the air lowered whilst the hauling engines were at full work, and if so, it is probable its duty was partly derived by the power stored in the air receivers, or expansion of the air therein, in addition to the power transmitted direct from the air compressors on surface during the time the engines were running. To arrive at the true duty that can be derived from compressed air, in comparison to the power applied, it was, he thought, requisite that there should be a continuous working of the air compressors, and of the engines worked by the compressed air, under conditions that would maintain regular pressures at the surface and underground, and that diagrams thus taken would show the true percentage of loss of power in transmission. To get high duty he thought the air-engines ought to be large enough to do the work without requiring air at very high pressure. If the air compressor has a cylinder of 40 in. diameter, and compresses the air to a pressure of 15 lbs. above the atmospheric pressure, with a piston velocity of 250 feet per minute, 98.979 horse-power will be expended. The power to be obtained from this air (at 15 lbs. pressure) forced out through half the stroke, will be 71.4 horse-power, representing a duty of 72.136 per cent. Again, with an air-compressing cylinder of half the area, working to a pressure of 45 lbs. per square inch over the atmosphere, with a piston velocity of 250 ft. per minute, the horse-power expended would be, as before, 98.979, but the power to be obtained from the compressed air at 45 lbs., forced out through one-fourth of the stroke, will be only 55.55-horse power, or a duty of only 56.102 per cent. of the applied power. With the temperature of the compressed air at different pressures being taken into account, the difference of the percentage of duty would be still more marked. He would remark that in comparing the relative value of compressed air and steam-power for use underground it should not be forgotten that a portion of the former, apparently lost in transmission by compressed air, is in fact utilised by the reduction of the temperature and increased ventilation of the mine whilst the air-engines are working.

Mr. Snape said there had apparently been an error made in taking off the diagrams; the atmospheric line should have been higher up. It was an error of diagram, not an error of calculation of the power.

Mr. A. J. STEVENS thought Mr. Snape must not assume the errors had arisen because the diagrams were wrong, for it must be remembered that the cylinder had something to do with it in communicating heat to the air that is being drawn in and passing through before the return stroke, and the effect of the temperature is, of course, apparent on the air in raising it at once above the atmospheric line.—Mr. COPE PEARCE did not think it would have time, because at the instant it must rise up to 4 lbs.

Mr. JAS. M. MURRIE would wish to ask Mr. Snape whether for an engine placed at the bottom of the shaft he considered it was more economical to use compressed air, or to take steam down the pit for its use?—Mr. J. Snape thought it would depend upon circumstances, but he questioned whether the steam would not incur the greater loss by condensation in a deep shaft.

Mr. BASSETT knew that the radiation from steam-pipes underground was very detrimental to the ventilation, and he hoped the day was not far distant when no engine worked by steam will be used underground, but that compressed air will be the only motive-power applied.

Mr. BARROW said it might be a matter of convenience to some extent whether they employed steam or compressed air underground, but there could be no doubt that in either case a loss of the power applied would occur. He had used compressed air for many years, and his experience was a perceptible gain in the pressure. In one case where he used the air some 1700 yards distant from the compressor the gauge showed the increased pressure, and in one case where they had used steam, conducted at a distance of 500 yards through pipes well felted and covered with cement, there was a loss of 7 lbs. pressure from condensation.

Mr. DAVID THOMAS had no doubt that great advantages were to be derived by the use of compressed air as a motive-power for use underground, especially as it enables the power to be applied at any point of the colliery workings, no matter how distant from the shaft, where it would also materially assist the ventilation. This power was now in its infancy, and it behoved mining engineers to give it their best consideration, because it was the only agency that could be effectively substituted for horse-power at the faces of the workings.

Mr. M. THURAN thought that at Dowlais they had been the first to introduce the principle of employing compressed air as a mechanical power in collieries, and after getting over the first difficulties found it answer admirably; they were now about setting some hauling machinery to work by it, at a distance of some 1200 yards from the compressor.

The PRESIDENT thought Mr. Snape had given the Institute a most important paper, and he did not know of any subject of greater importance in connection with the working and improvement of collieries. Another paper, by Mr. A. J. Stevens, was about to be read on the same subject, which will come on for discussion at the next meeting, and it would, therefore, perhaps be well to adjourn the further discussion of Mr. Snape's paper until that time.

The following papers, which will come on for discussion at the next meeting, were then read by the secretary:—"On Compressed

Air," by Mr. A. J. Stevens; "On Electric Engines for Underground Use," by Mr. W. Thomas; after which Mr. Al. Bassett read a paper "On Colliery Consumption of Fuel."

After the meeting a large number of the members dined together, as usual, at the Royal Hotel.

ROYAL INSTITUTION OF CORNWALL.

The spring meeting of the Royal Institution of Cornwall was held at the Museum, Truro, on Friday. In the unavoidable absence of the President, Sir John St. Aubyn M.P., the chair was filled by the senior Vice-President present, Dr. JAGO, F.R.S. The company included Mr. R. W. Fox, F.R.S., Mr. W. J. Henwood, F.R.S., Dr. Barham, Revs. Dr. Bannister, A. P. Moore, H. S. Slight, Capt. Oliver, R.A., Dr. Hudson, Messrs. R. Tweedy, Reginald Rogers, A. Paull, F. V. Budge (secretary), H. O. Remfry, D. G. Whitley, H. S. Leverton, R. N. Worth, S. Pascoe, J. James, and a number of ladies.

The CHAIRMAN, in the course of his opening remarks, said Sir John St. Aubyn last year commenced his address by calling attention to the subject of the Ancient Monuments Preservation Bill. That measure was not found at all acceptable then, and this year it had been brought forward again in an amended form. The Council of the Institution, although thinking some amendment still needed, sent in a petition in favour of the preamble, but in consequence probably of the political crisis, it had not since been brought forward. The Institution had been invited to assist in the meeting of the Royal Archaeological Institute at Exeter, by lending some of the more valuable objects from their museum; this they had agreed to do upon proper provision being made for their security. Their President, Sir John St. Aubyn, had been invited to take the chair in the section of "History." There would be excursions over Dartmoor in connection with the Exeter meeting; and as many of the members of the Institution would doubtless like to avail themselves of these, they would have no special excursion in Cornwall this year. Cornwall would be visited during the summer by the Institution of Mechanical Engineers, in connection with the Polytechnic Society; and the Royal Institution would, of course, be glad to render any assistance in its power, though he feared the time would be rather inconvenient. Dr. Jago then referred to gifts which had been made to the museum and library by Mr. W. P. Cocks, of Falmouth, Mr. W. J. Henwood, Sir John Maclean, F.S.A., Mr. W. Copeland Borlase, F.S.A., Mr. Reginald Rogers, and other gentlemen; and, in conclusion, spoke of the loss which had been sustained in the death of one of their honorary members, Dr. Morris, whose attainments as a philologist were of the most extraordinary character, and who had translated some of the Cornish miracle plays. For himself, he was a fortunate thing for people to speak a language which was not widely understood, as was the case with part of Wales. They had papers presented to them that day from Norway, one of which was printed in English, and the other in German, in order that they might gain the general circulation which they could not have if printed in Norwegian.—The reading of papers was then proceeded with:—

"On the Detrital Tin Ore of Cornwall," by Mr. WILLIAM JORY HENWOOD, F.R.S., F.G.S. This memoir contained a summary of observations made at intervals during the past 45 years. Of the four districts into which the writer divided the field of his labour, the first extends from the Land's End to the eastern sources of the Hayle river; the second is included between the Camborne, Illogan, Crowan, Wendron, and Constantine granite, and the eastern tributaries of Restronguet, a creek of Falmouth Harbour; the third is bounded on the west by the Truro river and the Gannel, and on the east by the Fowey and the lower part of the Camel; the fourth reaches from the eastern part of the third district to the Tamar. Throughout Cornwall the water shed is much nearer to the north coast than to the south. A short notice of the general characters in each district preceded particulars of the stream works now, or lately, wrought. The first district includes the detritus explored at Boswall, Penrose, Bejowans, Tregadwith, Cold Harbour, Treglase, and St. Erth. The second comprehends the Wendron Moors, which have been wrought from remote antiquity to the present time; the instructive works long, but we fear unprofitably, carried on by Mr. Joshua Fox in the neighbourhood of Mawan, as well as the productive deposit at Carnon, in Restronguet Creek, and near Perran Smelting House, with an ample notice, illustrated by figures of the human remains discovered at the last-named spot in 1823, which were sketched at the time by the late Rev. Canon Rogers, whose notes had been placed at the writer's disposal by the courtesy of his sons (Mr. Rogers, of Penrose, and the Rev. Saltern Rogers, of Gwennap). The third comprises the moors near St. Austell, Luxullian, Laniverry, Lanivet, St. Stephen's, where celtic, fibular, coins, and a remarkable vessel of pure tin, obtained by Dr. Boase (now of Dundee), were found amongst the refuse of earlier workmen by the late Mr. Thomas Nicholls, the freeholder. (It may be mentioned that these interesting objects were discovered within two miles of the entrenchment at Trevelgue Island, where bones of the *lus longifrons* were discovered by Mr. Nicholas Nicholls.) The fourth district comprises the wild moorlands between Lostwithiel, Bodmin, Camelford, Callington, and Looe. Tin ore (like gold) obtained in stream works was always of superior quality to that afforded by mines. The entire produce of gold in Cornwall during the present century had probably amounted to no more than a few ounces, but no district—perhaps no single stream work—has been utterly destitute of it, and all yet examined has been found of remarkable purity. In a conversation which took place at the annual meeting of the Institution in 1867 the writer expressed an opinion that the disuse of certain coinage towns, and the substitution of others, showed the produce of Eastern Cornwall to have been much greater, and of Western Cornwall much smaller, in past ages than they are respectively at present. The Stannary Roll, 34th Edward I. (1305-6), presented to the Institution by Sir John Maclean in 1870, and the official account of returns in the last year during which the coinage duties were levied, show the accuracy of that opinion. Thus, from (festival of St. Edmund) Nov. 16, 1305, to (that of St. Matthew) Sept. 21, 1306, there were coined at Lostwithiel 3291 blocks of tin, which weighed 176.5 tons avoirdupois; Bodmin, 1505 blocks, weighing 83.0 tons; Truro, 1298 blocks, weighing 68.6 tons; Trynny (?), 694 blocks, weighing 36.3 tons; Helston, 1065 blocks, weighing 6.1 tons; total, 6996 blocks, weighing 379.5 tons, or at the rate of about 437 tons a year. All that time the blocks weighed on an average 120 lbs., and the rate of coinage duty levied was 2s. sterling per 1000 lbs. weight of tin. From Midsummer, 1357, to Midsummer, 1358, the last year in which coinage duties were paid to the Duchy of Cornwall, the quantities of tin coined at the various privileged towns were—At Calstock, 393 blocks of tin, which weighed about 65.5 tons avoirdupois; Truro, 10,297 blocks, weighing 1715.2 tons; Hayle, 5152 blocks, weighing 908.9 tons; Penzance, 12,423 blocks, weighing 2070.5 tons; total, 28,565 blocks, weighing 4799.8 tons. Each block now weighs, on an average, about 330 lbs. During many years the Duchy levied a duty of 4s. per 120 lbs. on all tin produced in Cornwall, and of 1s. 6½d. per 112 lbs. on the produce of Devon. In 1837 s, therefore, the produce of Cornwall was more than ten times as much as in 1305-6; and Mr. Hunt's valuable Statistics show that since 1835 it has still further increased.

"The Tin Trade of Cornwall in the reign of Elizabeth and James compared with that of Edward I." by Sir JOHN MACLEAN, F.S.A. In this paper Sir John gave the particulars of the tin coinage of the county at decennial periods from 1577 to 1607, from two books which he had discovered in the Augmentation Office—comparing them with the details of the Stannary Roll of 1305 communicated to the Institution by himself. The coinage payments at the time under notice were 40s. for Cornwall against 15s. 7½d. for Devon per 1000 lbs. The coinage in 1305 was 965,562 lbs. a-year, and the annual average from 1577 to 1607, 991,979. Taking into consideration the difference in the value of money, the revenue derived by Elizabeth from the Stannaries of Cornwall was far inferior to that of her distant ancestor.

"On the occurrence of Wood Tin Ore in the Wheal Metal Lode at Wheal Vor, in Breage," by Capt. ARGALL. This paper recorded the occurrence at the hitherto unprecedented depth of 200 fathoms in Wheal Vor of wood tin, a fine specimen of which, accompanying the paper, was presented through Mr. Henwood.

Dr. HUDSON, of Redruth, read an interesting and valuable paper on "Dynamite in its Sanitary Aspect." The writer gave the preference to dynamite over both gun-cotton and gunpowder as an explosive agent, not only on account of the additional work done, but because the products of combustion were less injurious to the health of the miners. He was satisfied from experiments which he had made that dynamite was not chargeable with all the physical evils laid to its account. He believed that the acroline generated was the head and front of the offending, in consequence of the irritation which it caused to the mucous membrane. Respirators, which could be supplied for a few pence, had been suggested as a remedy; and Dr. Gladstone thought some liquid ammonia might be sprinkled about the ends before blasting.—Dr. BARHAM and the CHAIRMAN spoke very highly of this paper.

A paper on "Old Glouers in South-West Cornwall," by Mr. F. Lloyd, of Birmingham, was read by Mr. WHITLEY.

The Rev. Dr. BANNISTER gave an interesting account of the latest discovered miracle play, that of St. Meriasek, to whom Camborne Church is dedicated, and whose festival is still kept up in that parish.

"Romano-British Remains discovered at Trehan, in the parish of St. Keverne," by Mr. J. J. Rogers. In this paper, which was read by Mr. BUDGE, Mr. Rogers gave an account of some Romano-British antiquities discovered at Trehan, St. Keverne, in 1833, in some graves, and described such as he had been enabled to trace. The most important was a bronze mirror, closely resembling in type those found in the ancient cemetery at Mount Stanford, and described by Mr. C. Spence Bates, F.R.S. Mr. Rogers thought these discoveries militated against the theory advanced by Mr. W. C. Borlase, in his excellent work "Nenia Cornubia."

In a second paper, read by Dr. BARHAM, Mr. Rogers gave the additional particulars which later research had enabled him to glean respecting John de Trevis.

"Boyton Manor and Advowson and the Barton of Bradridge," by E. W. Dinkin.—The paper, in which the history and descent of the manor, barton, and advowson were traced, was read by Mr. BUDGE.

"Ornithological Notes," by Mr. E. H. RIDD and Mr. N. HARE.—Mr. RIDD's paper has already appeared in the Journal of the Institution; and Dr. BARHAM, commenting on the former, pointed to the evidence afforded of the progress westward of several birds which were formerly strangers to the county. Starlings had now taken to breed in the neighbourhood of Truro, and he thought they might yet hope to have the nightingale amongst them.

Dr. BARHAM then proceeded to comment upon the meteorology of the district, living special stress upon the investigations made by Mr. W. P. Dymond into the sea temperature at Falmouth, and the thermometric observations of Mr. R. W. Fox, on the ground temperature at Penjerick. These returns showed how much lower the ground temperature at Penjerick was than the temperature recorded at the Falmouth Observatory. This was a most important point in its

economic considerations; and showed the necessity of some means being devised for the protection when required of the early vegetable crops. It was only some 10 or 12 nights in a year that such a protection was needed; and it could readily be given by calico or netting, or in some such way. For want of such protection the cold recently led to 10,000, worth of damage. The returns of the Institution showed that 1872 was the most generally rainy year since 1841.

"The Common Seals of Cornwall," by Mr. R. N. WORTH. This common seal in the county, and of all the seals of the extinct religious and secular corporations, of which either matrices, impressions, or records were known to exist, some were described for the first time.

In conclusion, votes of thanks were passed to the readers of papers and donors, and to Dr. Jago for presiding.

CASTING METALS UNDER PRESSURE.

So much importance is now attached to artistic design in almost every branch of industry that it has become absolutely essential to dispense with expensive manual labour in the production of innumerable articles of ornament and utility in every-day use. In the various branches of the fancy metal trades this is particularly apparent of the different kinds of brass and steel tools of complicated design, and habitually used by workmen engaged in many branches of business, over-estimated. Among the most important inventions of this class introduced for many years past, that for casting metals under pressure is probably entitled to the greatest prominence, since it has as the Bessemer process has revolutionised the manufacture of steel.

Although castings sufficiently fine to be used without subsequent dressing or finishing for the machine tools now so generally seen in our workshops had been produced by Whitworth and others, the idea of turning out a medallion, a statuette, or any similar work of art from the mould, so highly finished that it could be sent into the market without further manipulation, had not been entertained until Messrs. Smith Brothers, of Philadelphia, brought forward their invention, the result of which was a success so complete as to leave nothing to be desired; the casting leaves the mould identical to the minutest particular with the pattern from which it has been taken, so that in the case of a statuette or a medallion it has all the appearance of having passed through the hands of a skilful finisher. We are, of course, precluded from giving specimens of the castings themselves; but their excellence can readily be judged of from the fact that the subjoined copy of a railway assurance policy is printed from an untouched cast in brass made from a well-known electro in actual use in one of the printing offices at Hartford:—

Railway Passengers Assurance Co.	
OF HARTFORD, CONN.	
\$3000.	Station No.
This Policy will be good for FIVE DAYS, commencing with the hour of date, and is subject to provisions of contract on the back hereof.	
C. D. PALMER, Secretary.	
Form 5	Not Transferable.
ONE DOLLAR.	

The engineers and others who have investigated the merits of the invention are unanimous in praising its simplicity and efficiency; and as it claimed to be equally applicable for bronze, copper, iron, or white metal, and to produce castings which require no skilled labour to finish them, it is not surprising that favourable reports have been made upon it. Thus, Mr. R. Mallet, M.I.C.E., F.R.S., reports that he has examined a large collection of moulds prepared for casting, and of bronze and white metal castings of ornamental objects, exhibited to him in London on May 5, and that in soundness, sharpness, and form of pattern, perfection and beauty of surface and finish, these castings, untouched by any tool after leaving the moulds, transcend any he has ever seen; he was particularly struck by the reproduction thus in bronze of a paragraph in the most minute type of a stereotype plate, the pattern stereotype from which the casting had been moulded had been reproduced by stereotype. Comparing the pattern with the casting, it was impossible to discover any difference between them, even when examined with a lens. The production of large or small type stereotype, &c., in bronze, a material wearing so much longer than type metal does, and at a cost so much below that of electrotyping, ought to afford a wide field of future application for this method of casting. If applied to casting objects in phosphor-bronze and copper he has no doubt results of great beauty and economic value may be obtained. He deems Mr. Smith's invention one likely to prove of great importance practically and commercially. Others who have examined the castings are equally satisfied. Mr. Henry Gardner, C.E., for example, writing that the samples which have been submitted to him and made by this process are in every sense equal to the finest specimen of skilled workmanship that he has ever seen. The faces and hollows are well defined, the edges sharp and the projection smooth, so much so that he finds it difficult to distinguish between the original and the copies.

In the examination of all processes of this class the first question which suggests itself to the practical man is whether there is any special difficulty in applying them; in this respect the present invention is certainly perfect, the most delicate flag-iron work leaves the mould with all the clearness and finish we are accustomed to admire in the highest class of Berlin iron jewellery, and if the subject be a salver, a medallion, or the copy of some complicated design in bronze, it is difficult to imagine that it has not been long in the hands of an experienced chaser. Yet the process by which these excellent results are obtained is so simple that there would be no inconvenience in introducing it in any Birmingham factory, and every workman, lad, and girl would be quite competent to carry on the several portions of the process. The copy from which the casting is to be reproduced is simply covered with a layer of composition consisting of fine clay and kaolin, and laid at the bottom of the moulding box, which is filled up with a kind of terra cotta or similar suitable backing. The ram of a screw press is then brought to bear, and the contents of the mould-box being compressed to about one-third of its thickness, the mass is formed into a hard tile, in the face of which the impression of the pattern is obtained. The sharpness of this mould surpasses anything but a steel die, and hence the castings obtained from it might readily be mistaken for work turned out by the die-sinker, although the number of minutes occupied in producing the mould would be fewer than the die-sinker would occupy weeks in making a similar die, the difference of cost being fully in proportion, and the metallic compression casting system permitting, moreover, of the design being reproduced in metal of any desired thickness, and of any degree of hardness.

The production of the mould has, of course, much to do with the quality of the finished casting, yet not more so than the mode in which the casting itself is effected. The channel communicating between the mass of molten metal and the gates of the castings is closed by a plug, behind which the molten metal itself is contained in a cylinder. The ordinary pressure of the metal in the cylinder does not remove this plug, but upon the compressing piston being brought into play the plug is forced to the end of the channel opening the communication with the whole series of moulds. To secure the freeing of the molten metal from any air it may contain the compression of the mass is commenced before communication with the hopper through which the cylinder is filled is cut off, and the thorough packing of the piston is ensured by covering the internal face of the cylinder with a suitable composition, which lutes up the piston more and more tightly as the compression goes on. When the whole of the moulds have been filled the cylinder is disconnected from the chamber containing them, and all is ready for repeating the operation. It will thus be seen that the whole process is as simple

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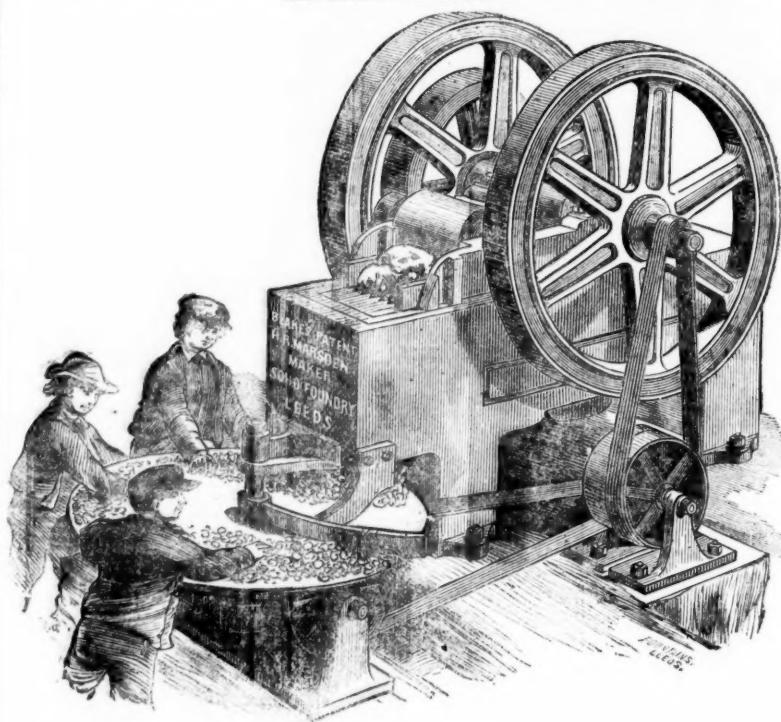
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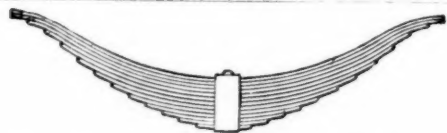
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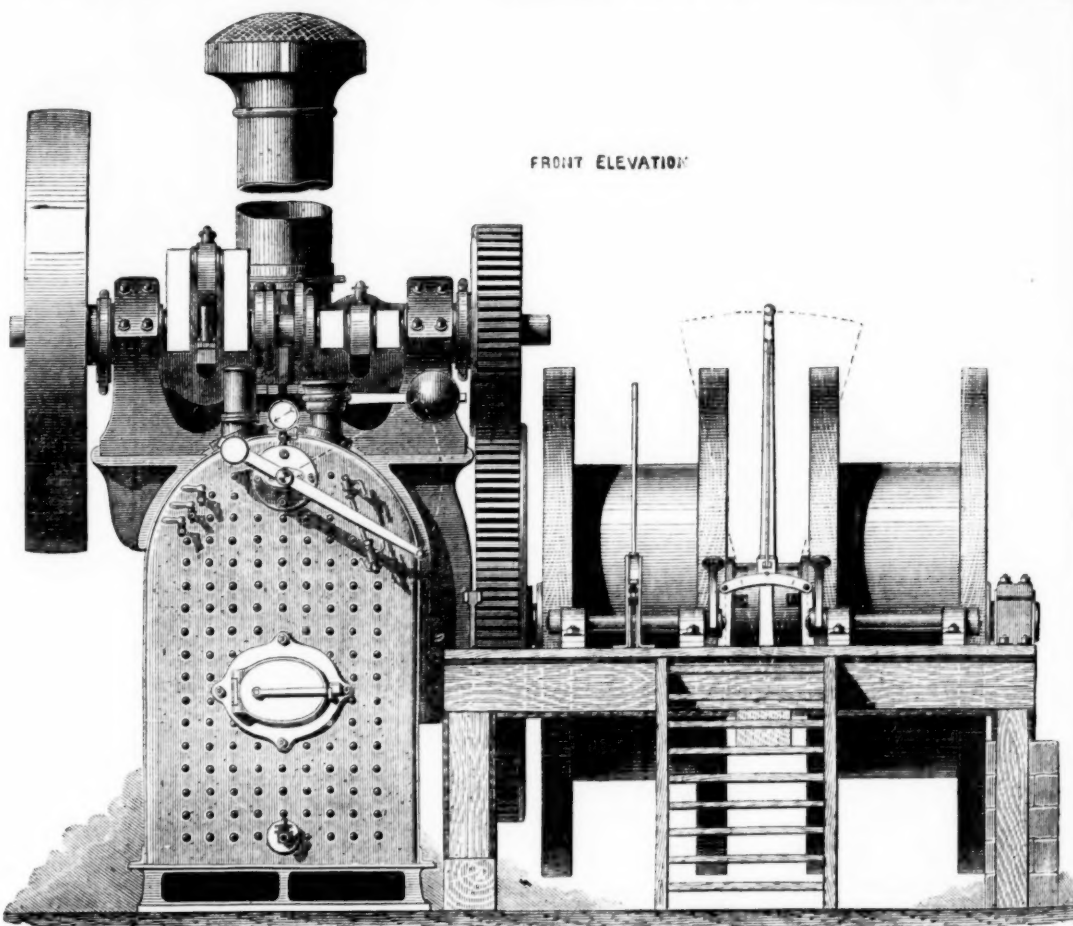
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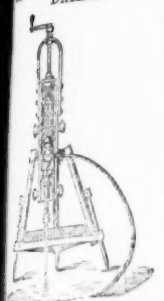
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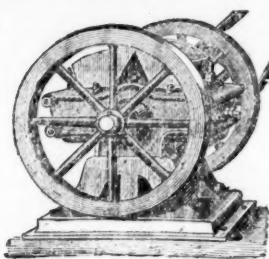
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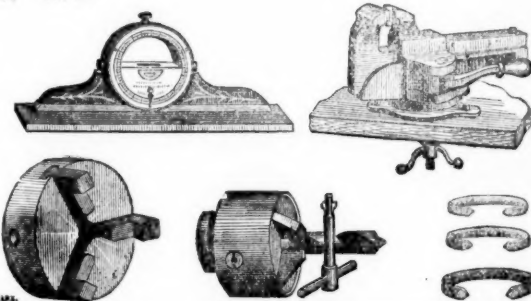
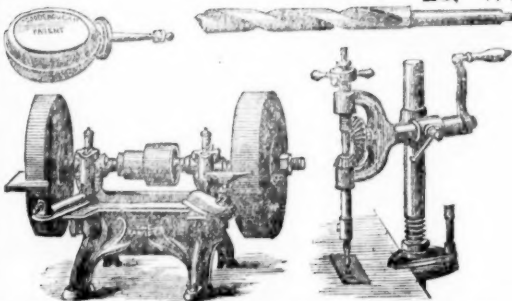
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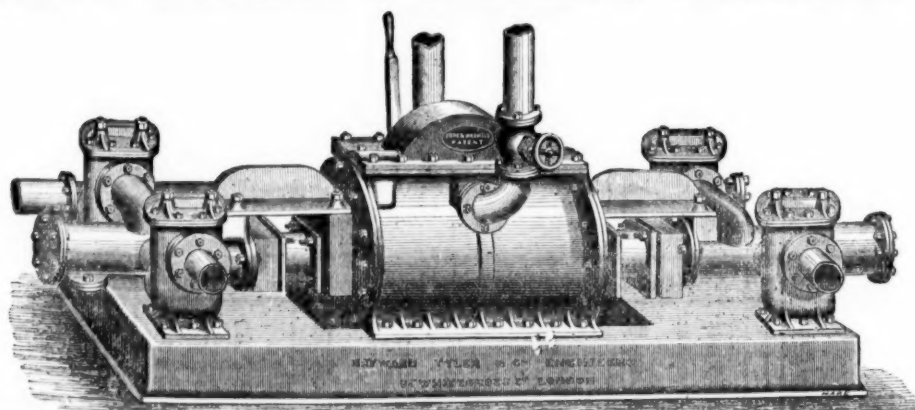
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SCOTCH, HEMATITE, STAFFORDSHIRE, DERBYSHIRE, FOREST OF DEAN, COLD BLAST AND REFINED PIG IRON, PUDDLED BARS AND BAR IRON, STEEL, SPELTER, TIN, COPPER, LEAD, SHEETS, ORES, BOLTS, NUTS, SPIKES, MANUFACTURED IRON, &c., &c.

SOLID DRAWN BRASS BOILER TUBES,

FOR LOCOMOTIVE AND MARINE BOILERS,

EITHER

MUNTZ'S OR GREEN'S PROCESS.

MUNTZ'S METAL COMPANY (LIMITED),

FRENCH WALLS,

NEAR BIRMINGHAM.

MINERS'

PRICKERS AND STEMMERS

OF

MUNTZ'S METAL.

ACCORDING TO THE NEW MINES REGULATION ACT.

BEST KNOWN MATERIAL.

MUNTZ'S METAL COMPANY (LIMITED),

FRENCH WALLS,

NEAR BIRMINGHAM.

TANGYE BROTHERS AND HOLMAN

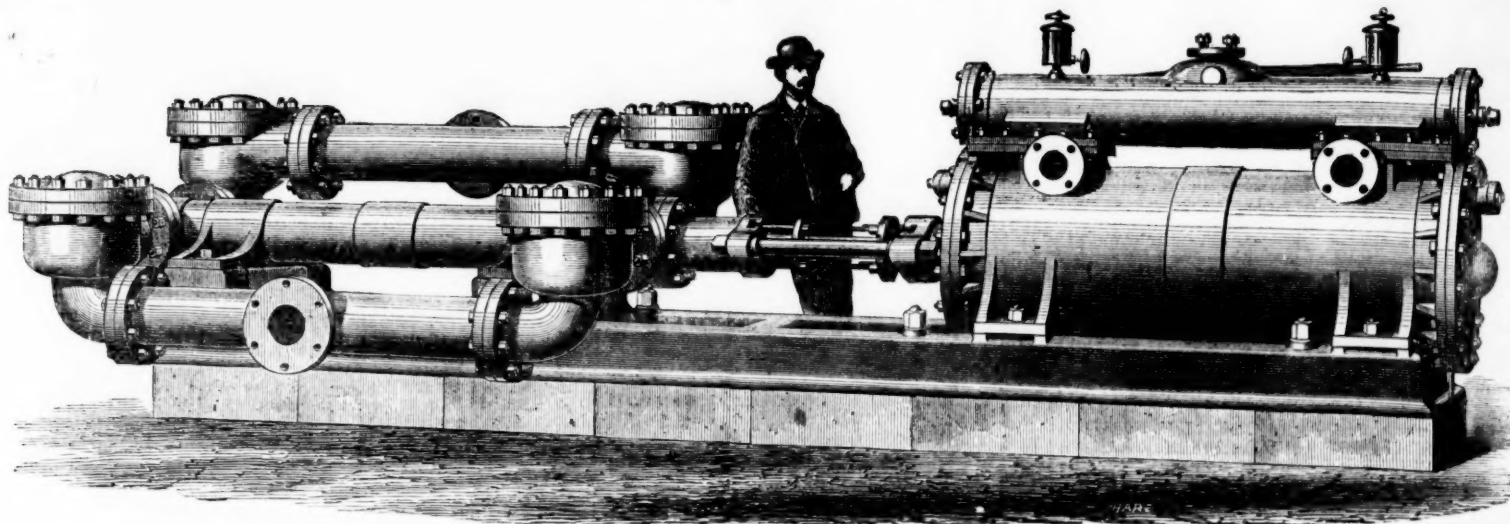
10, LAURENCE POUNTNEY LANE, LONDON,

CORNWALL WORKS (TANGYE BROTHERS), BIRMINGHAM,

NEWCASTLE-ON-TYNE (TANGYE BROTHERS AND RAKE), OFFICES AND WAREHOUSE, ST. NICHOLAS' BUILDINGS, SOLE MAKERS OF

THE "SPECIAL" DIRECT-ACTING STEAM PUMPING ENGINE FOR FORCING WATER FROM MINES.

Nearly 3000 in Use.



The "SPECIAL" Direct-acting Steam Pumping Engines require no costly Engine Houses or massive foundations, no repetition of Plunger Lifts, ponderous Connecting-rods, or complication of Pitwork, and allow a clear shaft for hauling purposes.

Extract from "ENGINEERING," September 6th, 1872:—

"The accompanying engraving illustrates a large specimen of the 'Special' Steam Pump, which was brought before the public about four years since by Messrs. Tangye Brothers and Holman. The Pump is the invention of Mr. S. Cameron, of New York, and since its introduction Messrs. Tangye have turned out nearly 3000 from their works.

"These pumps are of various sizes, and at first only small ones were made, but as their usefulness became developed the manufacturers designed pumping engines on the same principle for use in collieries. They were first applied to this purpose in the Newcastle collieries about three years since, and through the efforts of the late Mr. A. Stansfield Rake, under the direction of Messrs. Tangye, about 130 of these pumps had been introduced—principally in the collieries of the Durham and Newcastle districts, up to the end of 1870. They were adapted to perform the required duty—varying in almost every case—of forcing from 1000 to 10,000 gallons per hour from depths ranging from 100 to 500 ft. The success of this system of pumps led Mr. J. Bigland, the manager of Messrs. Pease's Bishop Auckland Collieries, to conclude that it was adapted for yet heavier work. The result of his investigations into its working led to the manufacture of the engine we have illustrated, for the Adelaide Collieries, belonging to Messrs. Pease, at Bishop Auckland.

"The construction of the Special Steam Pump is so well known

that we need now do no more than refer to the dimensions of the various parts. The steam cylinder is 26 in. diameter, and the pump—which is double acting—is 6½ in. diameter, with a 6-ft. stroke. The slide valve is steam-moved, and its alternate action is effected by means of two steel reversing valves, operated by the piston in the interior of the cylinder at either end. Hence there is no external mechanism except the piston rod, a few inches only of which is seen reciprocating between the stuffing boxes of the steam and pump cylinders. In the contract it was stipulated that the engine should raise 120 gallons per minute 1040 ft. high in a single lift, and this is more than accomplished, with apparently as much ease as if its load was delivered at only 100 ft. high.

"The engine-room at the Adelaide Collieries is situated at a depth of 1040 ft. below the surface, and is an arched chamber, about 100 ft. long by 20 ft. wide, and 10 ft. high at centre. At the far end of this chamber is a double-flued boiler, 27 ft. long and 7 ft. in diameter. Placed between the boiler and the shaft is the pumping engine we have been describing. It was started on June 6, 1871, and Mr. Bigland reported that, having measured its duty, he found the average of seven trials to be 137 gallons per minute, thus giving a higher duty than was stipulated for in the contract.

"A still larger Special Steam Pump than the one already described

has since been made by Messrs. Tangye for Messrs. Stannier's Collieries, Silverdale, Staffordshire. The steam cylinder of this engine is 32 in. in diameter, and the water cylinder 10½ in.; the stroke 6 ft., and the engine has to raise 22,500 gallons per hour 540 ft. high. Two out of eight engines for some extensive coal mines in Germany are also in a forward state; each of these engines is to be capable of raising 150 gallons per minute, or 9000 gallons per hour, 750 ft. high. This system of underground pumping engine undoubtedly carries with it the recommendations of simplicity and great power with a small number of mechanical parts. Its first cost is also moderate, as compared with the method of raising water from great depths by a series of 40 or 50 ft. lifts. Its practical value was tested in 1867 by the award of a silver medal by the Royal Falmouth Polytechnic Society, which is composed chiefly of mining engineers. In fact, these engines appear to solve a very important commercial question in mining operations—viz., the most economical and effective means of deep mine drainage. Their success has been established in the coal mines of Durham and Newcastle, and there is reason why their adoption should not follow, as occasion requires in the copper and tin mines of Cornwall, some of which are of great depth; and especially for foreign mines, where transport convenience and economy are of paramount consideration."

The "Special" Steam Pumping Engines are in use at the following among many other Collieries:—

Adelaide Colliery, Bishop Auckland.....	3 Pumps.	North Bitchburn Colliery, Darlington.....	2 Pumps.	Stott, James and Company, Burslem	1 Pump.
Acorn Colliery, Hexham	1 "	Newton Cap Colliery, Darlington	1 "	Straker and Love, Brancepeth Colliery	1 "
Blackfell Colliery, Gateshead	1 "	Normanby Mines	1 "	Seaton Delaval Colliery, near Newcastle	1 "
Black Boy Colliery, Gateshead	1 "	Oakenshaw Colliery	1 "	Thornley Colliery, Ferryhill	2 "
Castle Eden Colliery	2 "	Pease's West Colliery	2 "	Thompson, John, Gateshead	2 "
Carr, W. C., Newcastle.....	4 "	Pease, J. and J. W., near Crook	5 "	Trimdon Grange Colliery	1 "
Etherley Colliery	1 "	Pease, J. and J., Brandon Colliery	1 "	Tullhoe Colliery	4 "
Gidlow, T., Wigan	3 "	Pegswood Colliery, near Morpeth.....	2 "	Vobster and Mells Colliery	2 "
Haswell, Shotton and Easington Coal Company	3 "	Pelton Fell Colliery	1 "	Widdrington Colliery, Morpeth.....	5 "
Lochgelly Iron and Coal Company	2 "	Railey Fell Colliery, Darlington	1 "	Whitworth and Spennymoor Colliery	5 "
Lochore and Capeldrae Cannel Coal Company	6 "	Right Hon. Earl Durham, Fence Houses.....	1 "	Westerton Colliery, Bishop Auckland	1 "
Leather, J. T., near Leeds	2 "	Skelton Mines	1 "	Wardley Colliery, Gateshead	1 "
Lumley Colliery, Fence Houses.....	1 "	South Benwell Colliery	5 "	Westminster Brymbo Coal Company	2 "
Monkwearmouth Colliery, Sunderland	1 "	St. Helens (Tindale) Colliery	1 "	Wearside Coal and Iron Company	5 "

PARTICULARS OF THE "SPECIAL" STEAM PUMPING ENGINES SUITABLE FOR HIGH LIFTS IN MINES.

Diameter of Steam Cylinder	6	8	10	8	12	16	10	14	18	21	14	18	21	26	16	21	24
Diameter of Water Cylinder	3	3	3	4	4	4	5	5	5	5	6	6	6	6	7	7	7
Length of Stroke	24	24	36	24	36	48	24	36	36	48	36	36	48	72	36	48	48
Strokes per minute	50	30	20	30	20	15	50	20	20	15	20	20	15	10	20	15	15
Gallons per hour	2,200	2,200	2,200	3,900	3,900	3,900	6,100	6,100	6,100	6,100	8,500	8,500	8,500	8,500	11,900	11,900	11,900
Height in feet to which water can be raised with 40 lbs. pressure per square inch of steam at pump	240	425	665	240	540	960	240	470	775	1,058	330	540	740	1,140	312	540	700
Diameter of Suction and Delivery	2	2	2	3	3	3	3½	3½	3½	3½	4	4	4	4	5	5	5
Diameter of Steam Inlet	2	1½	1½	1½	2½	2½	1½	2½	3	3½	2½	3	3½	4	2½	3½	4
Diameter of Exhaust	1	1½	1½	1½	2½	3	1½	2½	3½	4	2½	3½	4	5	3	4	5

PARTICULARS, &c.—Continued.

Diameter of Steam Cylinder	30	18	24	30	32	18	24	30	36	21	30	36	42	26	36	44	50
Diameter of Water Cylinder	7	8	8	8	8	9	9	9	9	10	10	10	10	12	12	12	12
Diameter of Stroke	72	36	48	72	72	36	48	48	72	48	72	72	72	48	72	72	96
Strokes per minute	10	20	15	10	10	20	15	15	10	15	10	10	10	15	10	10	7½
Gallons per hour	11,900	15,600	15,600	15,600	15,600	19,800	19,800	19,800	19,800	24,400	24,400	24,400	24,400	35,240	35,240	35,240	35,240
Height in feet to which water can be raised with 40 lbs. pressure per square inch of steam at pump	1,100	300	540	840	960	240	427	665	960	264	540	780	1,062	282	540	800	1,040
Diameter of Suction and Delivery	5	6	6	6	6	7	7	7	7	8	8	8	8	10	10	10	10
Diameter of Steam Inlet	5	3	4	5	5½	3	4	5	6	3½	5	6	7	4	6	8	8½
Diameter of Exhaust	6	3½	5	6	6½	3½	5	6	7	4	6	7	8	5	7	9	10

PRICES OF THE ABOVE ON APPLICATION.

Any combination can be made between the Steam and Water Cylinders, to suit Height of Lift and Pressure of Steam.

TANGYE BROTHERS & HOLMAN, 10, Laurence Pountney Lane, London, E.C.